

# Project Manual

95% Construction Document  
Volume 01



COLLEGE OF  
**Osteopathic Medicine**  
AT THE CHEROKEE NATION

Tahlequah, Oklahoma

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July 26, 2019



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<b>Addendum No. 01</b>	<b>2019-02-08</b>	
<b>Bid Package No. 02, Rough Grading</b>	<b>2019-02-08</b>	
<b>Schematic Design Package</b>	<b>2019-02-22</b>	
<b>Bulk Steel Package</b>	<b>2019-03-15</b>	<b>Not for Construction</b>
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<b>65% Construction Document</b>	<b>2019-06-14</b>	<b>Not for Construction</b>
<b>BID Package No. 05, shell</b>	<b>2019-06-15</b>	<b>For Contractors Review Only</b>
<b>95% Construction Document</b>	<b>2019-07-26</b>	<b>Not for Construction</b>

### NOTE FOR REVISED SPECIFICATION SECTIONS

1. DELETED INFORMATION IS INDICATED BY A STRIKETHROUGH (IE, ~~THIS IS DELETED~~).
2. NEW INFORMATION IS INDICATED BY A DOUBLE UNDERLINE (IE, THIS IS ADDED).
3. ALL REVISED INFORMATION IS FURTHER IDENTIFIED BY A HEAVY VERTICAL LINE TO THE RIGHT OF ALL REVISIONS IN EACH INDIVIDUAL SPECIFICATION SECTION (REFER TO HEAVY BOLD LINE TO THE RIGHT FOR AN EXAMPLE).

## VOLUME 1

### DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

	<input type="checkbox"/>	00 1115	Invitation to Bid
	<input type="checkbox"/>	00 2113	Instructions to Bidders
2019-02-08	<input type="checkbox"/>	00 3100	Available Project Information
	<input type="checkbox"/>	00 4100	Bid Form
	<input type="checkbox"/>	00 5200	Agreement Form
	<input type="checkbox"/>	00 6100	Bonds
2019-02-08	<input type="checkbox"/>	00 7200	General Conditions
	<input type="checkbox"/>	00 7300	Supplementary Conditions

## DIVISION 01 - GENERAL REQUIREMENTS

	<input type="checkbox"/>	01 0500	Design Selections
	<input type="checkbox"/>	01 0510	Exterior Design Selections
	<input type="checkbox"/>	01 0520	Interior Design Selections
	<input type="checkbox"/>	01 1000	Summary
	<input type="checkbox"/>	01 2100	Allowances
2019-02-08	<input type="checkbox"/>	01 2200	Unit Prices
2019-02-08	<input type="checkbox"/>	01 2300	Alternates
2019-02-08	<input type="checkbox"/>	01 2500	Substitution Procedures
2019-02-08	<input type="checkbox"/>	01 2600	Contract Modification Procedures
2019-02-08	<input type="checkbox"/>	01 2900	Payment Procedures
2019-02-08	<input type="checkbox"/>	01 3100	Project Management and Coordination
2019-02-08	<input type="checkbox"/>	01 3200	Construction Progress Documentation
	<input type="checkbox"/>	01 3233	Photographic Documentation
	<input type="checkbox"/>	01 3300	Submittal Procedures
	<input type="checkbox"/>	01 4000	Quality Requirements
	<input type="checkbox"/>	01 4200	References
2019-02-08	<input type="checkbox"/>	01 4323	Special Inspection
2019-02-08	<input type="checkbox"/>	01 4339	Visual Mock-Up Requirements
2019-02-08	<input type="checkbox"/>	01 4516	Field Test for Water Leakage
	<input type="checkbox"/>	01 4540	Testing Mock-Up for Building Enclosure Systems
2019-02-08	<input type="checkbox"/>	01 5000	Temporary Facilities and Controls
2019-02-08	<input type="checkbox"/>	01 6000	Product Requirements
2019-02-08	<input type="checkbox"/>	01 7300	Execution
2019-02-08	<input type="checkbox"/>	01 7419	Construction Waste Management and Disposal
	<input type="checkbox"/>	01 7420	LEED Construction Waste Management and Disposal
2019-02-08	<input type="checkbox"/>	01 7700	Closeout Procedures
2019-02-08	<input type="checkbox"/>	01 7823	Operations and Maintenance Data
2019-02-08	<input type="checkbox"/>	01 7839	Project Record Documents
2019-02-08	<input type="checkbox"/>	01 7900	Demonstration and Training
	<input type="checkbox"/>	01 7910	Demonstration and Training
2019-02-08	<input type="checkbox"/>	01 8111	Sustainable Construction Requirements
	<input type="checkbox"/>	01 8112	LEED Construction Requirements
	<input type="checkbox"/>	01 8113	LEED Construction Requirements for New Construction and Major Renovations
	<input type="checkbox"/>	01 8123	LEED Construction Requirements for Commercial Interiors
	<input type="checkbox"/>	01 8133	LEED Construction Requirements for Core and Shell Development
	<input type="checkbox"/>	01 8143	LEED Construction Requirements for Schools
2019-02-08	<input type="checkbox"/>	01 9113	General Commissioning Requirements

## DIVISION 02 - EXISTING CONDITIONS

2019-01-18	<input type="checkbox"/>	02 1113	Selective Site Demolition
		02 1116	Building Demolition
	<input type="checkbox"/>	02 4119	Selective Demolition

## DIVISION 03 - CONCRETE

	<input type="checkbox"/>	03 0150	Concrete Patching
2019-03-20	<input type="checkbox"/>	03 1000	Concrete Forming and Accessories
	<input type="checkbox"/>	03 1100	Concrete Forming
	<input type="checkbox"/>	03 1500	Concrete Accessories
2019-03-20	<input type="checkbox"/>	03 2000	Concrete Reinforcing
2019-03-20	<input type="checkbox"/>	03 3000	Cast-In-Place Concrete
2019-07-26	<input checked="" type="checkbox"/>	03 3500	Concrete Finishing
2019-07-26	<input checked="" type="checkbox"/>	03 3543	Polished Concrete
	<input type="checkbox"/>	03 3600	Special Concrete Finishes
	<input type="checkbox"/>	03 3800	Post-Tensioned Concrete
	<input type="checkbox"/>	03 4100	Plant-Precast Structural Concrete
2019-07-26	<input checked="" type="checkbox"/>	03 4500	Architectural Precast Concrete
	<input type="checkbox"/>	03 4713	Tilt-Up Concrete
	<input type="checkbox"/>	03 4900	Glass-Fiber Reinforced Precast Concrete (GFRC)
	<input type="checkbox"/>	03 5216	Lightweight Insulating Concrete
	<input type="checkbox"/>	03 5300	Concrete Toppings
	<input type="checkbox"/>	03 5416	Hydraulic Cement Underlayment

## DIVISION 04 - MASONRY

	<input type="checkbox"/>	04 2100	Masonry Veneer
2019-03-20	<input type="checkbox"/>	04 2200	Concrete Unit Masonry
	<input type="checkbox"/>	04 2300	Glass Unit Masonry
2019-04-19	<input type="checkbox"/>	04 4200	Exterior Stone Cladding
	<input type="checkbox"/>	04 4216	Steel Supported Stone Cladding
	<input type="checkbox"/>	04 7200	Cast Stone Masonry
2019-07-26	<input checked="" type="checkbox"/>	04 7500	Adhered Masonry Veneer

## DIVISION 05 – METALS

2019-04-19	<input type="checkbox"/>	05 1000	Structural Steel
	<input type="checkbox"/>	05 1200	Structural Steel Framing
2019-04-14	<input type="checkbox"/>	05 1213	Architecturally Exposed Structural Steel (AESS) Framing
	<input type="checkbox"/>	05 1636	Barrier Cables
	<input type="checkbox"/>	05 2100	Steel Joists Framing
2019-04-19	<input type="checkbox"/>	053000	Metal Decking
	<input type="checkbox"/>	05 3100	Steel Decking
	<input type="checkbox"/>	05 3123	Steel Roof Deck System
	<input type="checkbox"/>	05 3133	Permanent Metal Forming
2019-07-26	<input checked="" type="checkbox"/>	05 4000	Cold-Formed Steel Framing
2019-07-26	<input checked="" type="checkbox"/>	05 4300	Slotted Channel Framing
2019-07-26	<input checked="" type="checkbox"/>	05 5000	Metal Fabrications
2019-04-19	<input type="checkbox"/>	05 5100	Metal Stairs
2019-07-26	<input checked="" type="checkbox"/>	05 5213	Pipe and Tube Railings
2019-07-26	<input checked="" type="checkbox"/>	05 5300	Metal Gratings
	<input type="checkbox"/>	05 5813	Ornamental Metal Column Covers
2019-04-19	<input type="checkbox"/>	05 6000	Metal Equipment Support System

2019-07-26	<input checked="" type="checkbox"/>	05 7000	Ornamental Metal
2019-07-26	<input checked="" type="checkbox"/>	05 7300	Ornamental Handrails and Railings

## **DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES**

2019-07-26	<input checked="" type="checkbox"/>	06 1053	Miscellaneous Rough Carpentry
2019-07-26	<input checked="" type="checkbox"/>	06 1643	Exterior Gypsum Sheathing
2019-07-26	<input checked="" type="checkbox"/>	06 4023	Interior Architectural Woodwork
	<input type="checkbox"/>	06 4223	Slatwall Paneling
	<input type="checkbox"/>	06 6100	Simulated Stone Fabrications
2019-07-26	<input checked="" type="checkbox"/>	06 6400	Plastic (FRP) Paneling
	<input type="checkbox"/>	06 6413	Translucent Resin Panel Fabrications
	<input type="checkbox"/>	06 6419	Simulated Stone Paneling
	<input type="checkbox"/>	06 6713	Louvered Light Diffusers
	<input type="checkbox"/>	06 6813	Plastic Gratings

## **DIVISION 07 - THERMAL AND MOISTURE PROTECTION**

	<input type="checkbox"/>	07 0151	Preparation for Re-Roofing
	<input type="checkbox"/>	07 0152	Patching of Existing Roofing
	<input type="checkbox"/>	07 1114	Asphalt Mastic Dampproofing
	<input type="checkbox"/>	07 1328	Pre-Applied Sheet Waterproofing
	<input type="checkbox"/>	07 1352	Modified Bituminous Sheet Waterproofing
	<input type="checkbox"/>	07 1413	Hot Fluid-Applied Rubberized Asphalt Waterproofing
2019-04-19	<input type="checkbox"/>	07 1416	Cold Fluid-Applied Waterproofing
2019-07-26	<input checked="" type="checkbox"/>	07 1616	Crystalline Waterproofing
	<input type="checkbox"/>	07 1700	Bentonite Waterproofing
2019-07-26	<input checked="" type="checkbox"/>	07 1800	Traffic Coatings
2019-07-26	<input checked="" type="checkbox"/>	07 1900	Water Repellents
2019-04-19	<input type="checkbox"/>	07 2100	Thermal Insulation
2019-07-26	<input checked="" type="checkbox"/>	07 2119	Spray-Applied Foam Insulation
2019-07-26	<input checked="" type="checkbox"/>	07 2400	EIFS
	<input type="checkbox"/>	07 2423	DEFS for Soffits
	<input type="checkbox"/>	07 2500	Mechanically Fastened Air and Water Barriers
2019-03-20	<input type="checkbox"/>	07 2600	Under-Slab Vapor Retarder
	<input type="checkbox"/>	07 2613	Rubberized Asphalt Vapor Retarders
	<input type="checkbox"/>	07 2617	Below Slab Vapor Retarders
2019-07-26	<input checked="" type="checkbox"/>	07 2713	Self-Adhering Air and Water Barriers
2019-07-26	<input checked="" type="checkbox"/>	07 2726	Fluid-Applied Air and Water barriers
	<input type="checkbox"/>	07 3113	Asphalt Shingles
	<input type="checkbox"/>	07 3127	Simulated Slate Roofing
	<input type="checkbox"/>	07 3200	Roof Tiles
2019-04-19	<input type="checkbox"/>	07 4114	Metal Roof Panels
2019-07-26	<input checked="" type="checkbox"/>	07 4213	Formed Metal Wall Panels
	<input type="checkbox"/>	07 4216	Modular Metal Wall Panels
	<input type="checkbox"/>	07 4229	Terra Cotta Wall Panels
2019-07-26	<input checked="" type="checkbox"/>	07 4243	Composite Metal Wall Panels
2019-07-26	<input checked="" type="checkbox"/>	07 4244	Composite Wood Wall Panels

2019-07-26	<input checked="" type="checkbox"/>	07 4623	Cedar Soffit Siding
2019-07-26	<input checked="" type="checkbox"/>	07 4800	Rainscreen Attachment System
	<input type="checkbox"/>	07 5013	Single-Ply Membrane Roofing
2019-07-26	<input checked="" type="checkbox"/>	07 5216	Modified Bituminous Membrane Roofing
	<input type="checkbox"/>	07 5556	Fluid-Applied Protected Membrane Roofing
	<input type="checkbox"/>	07 5563	Vegetated Protected Membrane Roofing
2019-07-26	<input checked="" type="checkbox"/>	07 6200	Flashing and Sheet Metal
2019-07-26	<input checked="" type="checkbox"/>	07 7200	Roof Accessories
	<input type="checkbox"/>	07 7600	Roof Pavers and Pedestal Assemblies
2019-07-26	<input checked="" type="checkbox"/>	07 8116	Cementitious Fireproofing
	<input type="checkbox"/>	07 8123	Intumescent Mastic Fireproofing
2019-07-26	<input checked="" type="checkbox"/>	07 8413	Penetration Firestopping
2019-07-26	<input checked="" type="checkbox"/>	07 8446	Fire-Resistive Joint Firestopping
2019-07-26	<input checked="" type="checkbox"/>	07 9100	Preformed Joint Seals
2019-07-26	<input checked="" type="checkbox"/>	07 9200	Joint Sealants
	<input type="checkbox"/>	07 9500	Expansion Control

## DIVISION 08 - OPENINGS

	<input type="checkbox"/>	08 0610	Door Schedule
2019-07-26	<input checked="" type="checkbox"/>	08 1113	Hollow Metal Doors and Frames
	<input type="checkbox"/>	08 1114	Interior Hollow Metal Frames
	<input type="checkbox"/>	08 1170	Steel Fire Door and Frame Assembly
2019-07-26	<input checked="" type="checkbox"/>	08 1216	Interior Aluminum Frames
2019-07-26	<input checked="" type="checkbox"/>	08 1416	Prefinished Flush Wood Doors
	<input type="checkbox"/>	08 1433	Stile and Rail Wood Doors
2019-07-26	<input checked="" type="checkbox"/>	08 3113	Access Doors and Frames
2019-07-26	<input checked="" type="checkbox"/>	08 3213	Sliding Aluminum-Framed Glass Doors
	<input type="checkbox"/>	08 3313	Coiling Counter Doors
	<input type="checkbox"/>	08 3323	Overhead Coiling Doors
	<input type="checkbox"/>	08 3326	Overhead Coiling Grilles
	<input type="checkbox"/>	08 3338	Interior Side Coiling Grilles
2019-07-26	<input checked="" type="checkbox"/>	08 3400	Special – Function Doors
	<input type="checkbox"/>	08 3470	Acoustical Metal Door, Window, and Frame Assemblies
	<input type="checkbox"/>	08 3513	Folding Doors
	<input type="checkbox"/>	08 3515	Accordion Folding Fire Doors
	<input type="checkbox"/>	08 3613	Sectional Overhead Doors
2019-07-26	<input checked="" type="checkbox"/>	08 4110	Interior Storefront
2019-04-19	<input type="checkbox"/>	08 4127	Exterior All-Glass Entrances and Storefronts
	<input type="checkbox"/>	08 4128	Interior All-Glass Entrances and Storefronts
	<input type="checkbox"/>	08 4213	Exterior Aluminum Entrance Doors
2019-07-26	<input checked="" type="checkbox"/>	08 4216	Interior Aluminum Entrance Doors
2019-04-19	<input type="checkbox"/>	08 4229	Automatic Entrances
	<input type="checkbox"/>	08 4233	Revolving Entrance Doors
2019-07-26	<input checked="" type="checkbox"/>	08 4243	Medical Specialty Sliding Entrances
2019-07-26	<input checked="" type="checkbox"/>	08 4400	Glazed Aluminum Framing Systems
	<input type="checkbox"/>	08 4426	Structural Glass Curtainwall
	<input type="checkbox"/>	08 4500	Translucent Insulating Panel Assemblies
	<input type="checkbox"/>	08 5113	Aluminum Windows

2019-07-26	<input checked="" type="checkbox"/>	08 5619	Sliding Pass Windows
	<input type="checkbox"/>	08 5656	Bullet-Resistive Windows
	<input type="checkbox"/>	08 6200	Unit Skylights
	<input type="checkbox"/>	08 6300	Metal-Framed Skylights
2019-07-26	<input checked="" type="checkbox"/>	08 7100	Door Hardware
	<input type="checkbox"/>	08 7121	Interior Automatic Door Operators for Staff Use
2019-07-26	<input checked="" type="checkbox"/>	08 7122	Automatic Door Operators for the Disabled
2019-07-26	<input checked="" type="checkbox"/>	08 8000	Glazing
	<input type="checkbox"/>	08 8300	Unframed Mirrored Glazing
2019-07-26	<input checked="" type="checkbox"/>	08 8816	Between Glass Blinds Units
	<input type="checkbox"/>	08 8840	Switchable Privacy Glass Units
	<input type="checkbox"/>	08 9100	Wall Louvers

## DIVISION 09 - FINISHES

	<input type="checkbox"/>	09 0565	Floor Preparation for Renovation Work
	<input type="checkbox"/>	09 0600	Room Finish Schedule
	<input type="checkbox"/>	09 2300	Gypsum Plastering
2019-07-26	<input checked="" type="checkbox"/>	09 2400	Portland Cement Plastering
	<input type="checkbox"/>	09 2600	Veneer Plastering
	<input type="checkbox"/>	09 2613	Gypsum Veneer Plastering
	<input type="checkbox"/>	09 2713	GFRG Fabrications
2019-07-26	<input checked="" type="checkbox"/>	09 2900	Gypsum Board Assemblies
2019-07-26	<input checked="" type="checkbox"/>	09 3000	Tiling
2019-07-26	<input checked="" type="checkbox"/>	09 5113	Acoustical Panel Ceilings
	<input type="checkbox"/>	09 5133	Acoustical Metal Pan Ceilings
	<input type="checkbox"/>	09 5135	Snap-in Metal Pan Ceilings
	<input type="checkbox"/>	09 5423	Linear Metal Ceilings
	<input type="checkbox"/>	09 5436	Suspended Decorative Grids
2019-07-26	<input checked="" type="checkbox"/>	09 6115	Concrete Floor Sealer
	<input type="checkbox"/>	09 6116	Liquid Floor Hardener
	<input type="checkbox"/>	09 6119	Moisture Floor Treatment
	<input type="checkbox"/>	09 6340	Stone Flooring
	<input type="checkbox"/>	09 6400	Wood Flooring
2019-07-26	<input checked="" type="checkbox"/>	09 6500	Resilient Flooring
2019-07-26	<input checked="" type="checkbox"/>	09 6513	Resilient Base and Accessories
	<input type="checkbox"/>	09 6520	Interlocking Rubber Tile Flooring
2019-07-26	<input checked="" type="checkbox"/>	09 6566	Resilient Athletic Flooring
2019-07-26	<input checked="" type="checkbox"/>	09 6603	Precast Terrazzo Flooring for Stairs
	<input type="checkbox"/>	09 6613	Thick-Set Terrazzo Flooring
2019-07-26	<input checked="" type="checkbox"/>	09 6623	Thin-Set Terrazzo Flooring
	<input type="checkbox"/>	09 6723	Resinous Flooring
2019-07-26	<input checked="" type="checkbox"/>	09 6800	Carpeting
	<input type="checkbox"/>	09 6900	Access Flooring
2019-07-26	<input checked="" type="checkbox"/>	09 7200	Wall Covering
	<input type="checkbox"/>	09 7213	Tackboard Wall Coverings
	<input type="checkbox"/>	09 7500	Interior Stone Facing
	<input type="checkbox"/>	09 7723	Fabric Wrapped Panels
2019-07-26	<input checked="" type="checkbox"/>	09 8433	Acoustical Wall Panels
2019-07-26	<input checked="" type="checkbox"/>	09 9100	Painting
	<input type="checkbox"/>	09 9413	Textured Interior Coatings
	<input type="checkbox"/>	09 9600	High-Performance Coatings

	<input type="checkbox"/>	09 9613	Multicolored Interior Coatings
2019-07-26	<input checked="" type="checkbox"/>	09 9653	Elastomeric Coatings
2019-07-26	<input checked="" type="checkbox"/>	09 9663	Textured Acrylic Coating

## DIVISION 10 - SPECIALTIES

2019-07-26	<input checked="" type="checkbox"/>	10 1100	Visual Display Boards
	<input type="checkbox"/>	10 1146	Visual Display Fabrics
2019-07-26	<input checked="" type="checkbox"/>	10 1400	Interior Signage
	<input type="checkbox"/>	10 1443	Photoluminescent Exit Path Marking System
	<input type="checkbox"/>	10 1700	Telephone Specialties
2019-07-26	<input checked="" type="checkbox"/>	10 2113	Toilet Compartments
2019-07-26	<input checked="" type="checkbox"/>	10 2115	Cubicle Specialties
	<input type="checkbox"/>	10 2213	Wire Mesh Partitions
	<input type="checkbox"/>	10 2223	Accordion Folding Partitions
2019-07-26	<input checked="" type="checkbox"/>	10 2238	Operable Panel Partition
	<input type="checkbox"/>	10 2239	Vertically Folding Panel Partitions
2019-07-26	<input checked="" type="checkbox"/>	10 2613	Wall and Corner Guards
2019-07-26	<input checked="" type="checkbox"/>	10 2813	Toilet Accessories
	<input type="checkbox"/>	10 2819	Shower Doors and Enclosures
2019-07-26	<input checked="" type="checkbox"/>	10 4116	Emergency Key Cabinets
2019-07-26	<input checked="" type="checkbox"/>	10 4400	Fire Protection Specialties
	<input type="checkbox"/>	10 4450	Automated External Defibrillators (AED)
2019-07-26	<input checked="" type="checkbox"/>	10 5113	Metal Lockers
2019-04-19	<input type="checkbox"/>	10 5116	Wood Lockers
	<input type="checkbox"/>	10 5503	USPS-Delivery Postal Specialties
	<input type="checkbox"/>	10 5506	Private-Delivery Postal Specialties
2019-07-26	<input checked="" type="checkbox"/>	10 5713	Wall Mounted Coat Rack and Shelf
2019-07-26	<input checked="" type="checkbox"/>	10 7310	Aluminum Walkways and Canopies
2019-07-26	<input checked="" type="checkbox"/>	10 7500	Flagpoles

## DIVISION 11 - EQUIPMENT

	<input type="checkbox"/>	11 1300	Loading Dock Equipment
2019-07-26	<input checked="" type="checkbox"/>	11 2400	Building Maintenance Equipment
2019-07-26	<input checked="" type="checkbox"/>	11 5213	Projection Screens
2019-07-26	<input checked="" type="checkbox"/>	11 7000	Medical Equipment
	<input type="checkbox"/>	11 7313	Wall-Mounted Fold-Up Writing Surface
	<input type="checkbox"/>	11 7316	Wall-Mounted Chart Rack

## DIVISION 12 - FURNISHINGS

	<input type="checkbox"/>	12 2113	Horizontal Louver Blinds
	<input type="checkbox"/>	12 2116	Vertical Louver Blinds
2019-07-26	<input checked="" type="checkbox"/>	12 2413	Roller Window Shades
	<input type="checkbox"/>	12 2500	Between Glass Blinds
	<input type="checkbox"/>	12 3553	Laboratory Casework
2019-07-26	<input checked="" type="checkbox"/>	12 3571	Stainless Steel Casework
	<input type="checkbox"/>	12 3640	Stone Countertops
2019-07-26	<input checked="" type="checkbox"/>	12 3661	Simulated Stone Countertops

	<input type="checkbox"/>	12 4816	Entrance Floor Grilles
2019-07-26	<input checked="" type="checkbox"/>	12 4843	Entrance Floor Mats
	<input type="checkbox"/>	12 6300	Stadium Seating
2019-07-26	<input checked="" type="checkbox"/>	12 9313	Bicycle Racks

### **DIVISION 13 - SPECIAL CONSTRUCTION**

	<input type="checkbox"/>	13 2817	Ballpark Netting and Supports
	<input type="checkbox"/>	13 3448	Pre-Fabricated Rooftop Helipad
	<input type="checkbox"/>	13 4900	Radiation Protection
	<input type="checkbox"/>	13 4923	RF/MRI Modular Shielding Enclosure
2019-04-19	<input type="checkbox"/>	13 8500	Seismic Protection

### **DIVISION 14 - CONVEYING EQUIPMENT**

	<input type="checkbox"/>	14 1000	Dumbwaiters
2019-04-19	<input type="checkbox"/>	14 2100	Electric Traction Elevators
	<input type="checkbox"/>	14 2400	Hydraulic Elevators
	<input type="checkbox"/>	14 3100	Escalators
	<input type="checkbox"/>	14 9100	Chutes
	<input type="checkbox"/>	14 9200	Pneumatic Tube Systems

### **DIVISION 31 - EARTHWORK**

2019-01-18	<input type="checkbox"/>	31 1000	Site Clearing
	<input type="checkbox"/>	31 2000	Earth Moving
2019-02-08	<input type="checkbox"/>	31 2200	Grading
2019-02-08	<input type="checkbox"/>	31 2300	Excavation and Fill
2019-03-20	<input type="checkbox"/>	31 2311	Earthwork for Building Construction
	<input type="checkbox"/>	31 2400	Earthwork for Structures
2019-01-18	<input type="checkbox"/>	31 2500	Erosion and Sedimentation Controls
	<input type="checkbox"/>	31 3116	Termite Control
	<input type="checkbox"/>	31 6213	Prestressed Concrete Piles
	<input type="checkbox"/>	31 6216	Steel H Piles
	<input type="checkbox"/>	31 6218	Mini-Piles
	<input type="checkbox"/>	31 6329	Drilled Concrete Piers

### **DIVISION 32 - EXTERIOR IMPROVEMENTS**

2019-02-08	<input type="checkbox"/>	32 1100	Base Courses
2019-04-19	<input type="checkbox"/>	32 1200	Flexible Paving
2019-02-08	<input type="checkbox"/>	32 1300	Rigid Paving
	<input type="checkbox"/>	32 1313	Concrete Paving
2019-02-08	<input type="checkbox"/>	32 1373	Concrete Paving Joint Sealants
		32 1413	Interlocking Precast Concrete Paving
	<input type="checkbox"/>	32 1416	Brick unit Paving
	<input type="checkbox"/>	32 1440	Stone Paving
2019-02-08	<input type="checkbox"/>	321613	Curbs and Gutters

<input type="checkbox"/>	32 1715	Parking Accessories
<input type="checkbox"/>	32 3113	Chain Link Fencing
<input type="checkbox"/>	32 3115	Tubular Steel Fencing
<input type="checkbox"/>	32 3117	Gate Operators
<input type="checkbox"/>	32 3121	Cable Guardrail System

## **DIVISION 33 - UTILITIES**

	<input type="checkbox"/>	33 1000	Water Utilities
2019-04-19	<input type="checkbox"/>	33 3000	Sanitary Sewerage Utilities
2019-04-19	<input type="checkbox"/>	33 3200	Wastewater Utility Pumping stations
2019-04-19	<input type="checkbox"/>	33 3400	Sanitary Utility Sewerage Force Mains
2019-04-19	<input type="checkbox"/>	33 4000	Storm Drainage Utilities
2019-04-19	<input type="checkbox"/>	33 4600	Sub drainage Pipe
	<input type="checkbox"/>	33 4613	Foundation Drainage System

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**SECTION 03 3500**  
**CONCRETE FINISHING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Work required for this Section includes concrete finishing of cast-in-place concrete including supplementary products necessary to complete the concrete installation.

**1.2 DEFINITIONS**

- A. Curing: Action taken by which hydraulic-cement concrete matures and develops hardened properties over time as result of continued hydration of cement in presence of sufficient water and heat.
- B. Envelope: Vertical distance between two level lines or planes.
- C. Flatness: Degree to which surface approximates plane.
- D. Levelness: Degree to which line or surface parallels horizontal. Horizontal is normal to direction of gravity.
- E. Minimum Local Value: Minimum local F(F) or F(L) value at given floor level, taken within one floor test area defined as Minimum Local Area.
  - 1. Boundaries of Minimum Local Areas may not cross construction joints.
  - 2. Slabs-on-Grade: Minimum Local Area will be bounded by construction and/or control joints, or by column lines and half-column lines, whichever is smaller.
  - 3. Elevated Slabs: Minimum Local Area will be bounded by column lines and/or half-column lines.
- F. Specified Overall Value: Composite value of samples taken at given level, regardless of number of concrete placements required to complete level. Specified overall F-numbers represent minimum values allowed for entire floor, looked at as whole.

**1.3 ACTION SUBMITTALS**

- A. Product Data: Submit copies of manufacturers' technical literature for specified products.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
  - 2. Submittal(s) shall identify location(s) of Contractor's intended application of product(s).

**1.4 INFORMATIONAL SUBMITTALS**

- A. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.

- B. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".
- C. Manufacturer(s) Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.
- D. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
- E. Work Plan for Out-of-Tolerance Floor Surfaces:
  - 1. Detailed work plan for areas where remedial measures are necessary to correct unsatisfactory as-built floor flatness/levelness conditions. Include following information:
  - 2. Specific boundaries of area to receive remedial work
  - 3. Methods and products proposed.
  - 4. Grout/topping/underlayment product literature.
- F. Repair Records: At conclusion of project, submit record of repairs as part of job close-out information. Record shall be complete in detail and will serve as Owner's documentation of repairs made to concrete work. Include following information.
  - 1. Location and size of repair. Include individual identification number for each repair and provide dimension(s) from established grids, elevations, and approximate repair size.
  - 2. Statement of reason(s) for repair.
  - 3. Repair material(s) applied.
  - 4. Date of repair application.
  - 5. Name(s) of trained installer used for each repair.

## **1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Installer Qualifications for Specialized Concrete Finishes:
  - 1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  - 2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
  - 3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products including but not limited to the following:
    - a. Overlay and repair mortar.
    - b. Crack repair/injection.

- C. Mock-Ups for Specialized Concrete Finishes: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.
1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.
    - a. Show typical components, attachments to building structure, and requirements of installation.
  2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
  3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
  4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
  5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

## **1.6 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.
1. Participants:
    - a. Architect.
    - b. Contractor, including superintendent.
    - c. Installer, including project manager and supervisor.
    - d. If requested, Manufacturer's qualified technical representative.
    - e. Installers of other construction interfaced with Work.
  2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
    - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
    - b. Review Contract Document requirements.
    - c. Review approved submittals.
    - d. Review inspection and testing requirements.
    - e. Review environmental conditions and procedures for coping with unfavorable conditions.
    - f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
  3. Record discussions, including decisions and agreements, and prepare report.

## **1.7 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation
- C. Coordinate openings, penetrations, and sleeve requirements with final equipment selections and locations by MEP sub-contractors. Verify any changes with Engineer of Record prior to fabrication.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers/Fabricators and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers/fabricators listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
- B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other available manufacturers/fabricators offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

### **2.3 CURING MATERIALS**

- A. Liquid Membrane-Forming Curing Compound:
  - 1. Description: ASTM C 1315, Type 1, Class A, clear water-based acrylic blend curing compound with 25 percent solid content (minimum); non-yellowing under ultraviolet light after 500 hours of test in accordance with ASTM D 4587; water based, VOC/AIM compliant. Sodium silicate compounds are not acceptable.
  - 2. Manufacturers and Products:
    - a. Euclid Chemical Co.; Super Diamond Clear VOX.
    - b. Lambert Corp.; UV Safe Seal.
    - c. L & M Const. Chemicals; Lumiseal WB Plus.
    - d. W.R. Meadows, Inc.; Vocomp-25 or Vocomp-30.
  - 3. Alternate Products: Products listed above are non-yellowing. Other products of same manufacturers which exhibit moderate yellowing in accordance with ASTM C 1315, Type 1, Class B, and comply with other specified requirements and limitations herein may be acceptable pending Architect/Engineer review and approval.
- B. Dissipating Resin Membrane-Forming Curing Compound with Fugitive Dye:
  - 1. Description: ASTM C 309, Type 1-D, Class B, water-based and formulated with hydrocarbon resins, which begins chemical break-down after approximately 4 weeks.
  - 2. Manufacturers and Products:

- a. Euclid Chemical Co.; Kurez DR VOX.
- b. L & M Const. Chemicals; L&M Cure R.
- c. Lambert Corp.; Aqua Kure.
- d. W.R. Meadows; 1100-Clear Series.

C. Evaporation Retarder:

- 1. Description: Waterborne monomolecular film-forming compound manufactured for application to plastic concrete, preferably leaving no residue after concrete hardens. Residue remaining after concrete hardens shall be removed in accordance with manufacturer's recommendations.
- 2. Manufacturers and Products:
  - a. BASF; MasterKure ER 50 (Formerly Confilm).
  - b. Euclid Chemical Co.; Eucobar.
  - c. Lambert Corp.; Lambco Skin.
  - d. L&M Construction Chemicals, Inc.; E-Con.
  - e. W.R. Meadows; EVAPRE.
  - f. Sika Corporation; SikaFilm.

D. Moisture-Retaining Cover:

- 1. Description: ASTM C 171, curing paper, white opaque polyethylene film, and polypropylene nonwoven fabric with white coating applied to one side, or white burlap-polyethylene sheeting. Polyethylene film not permitted at unformed surfaces. Clear or black polyethylene film permitted at interior formed surfaces with no exposure to sunlight during curing period.
- 2. Manufacturer and Product:
  - a. Curing Paper: Fortifiber Corp.; Orange Label, Sisaldraft curing paper.
  - b. Polyethylene Film: As recommended by Contractor; submit for Architect's review.
  - c. Polypropylene Nonwoven Fabric:
    - 1) Reef Industries/Armorlon; Transguard 4000.
    - 2) PNA Construction Technologies; Hydracure.
    - 3) Sika Corporation; Ultracure NCF.
  - d. White Burlap-Polyethylene Sheeting: As recommended by Contractor; submit for Architect's review.

- E. Absorptive Cover: AASHTO M 182, Class 2, Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd.

## 2.4 FLOOR AND SLAB TREATMENTS

- A. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery with emery aggregate containing not less than 50 percent aluminum oxide and not less than 25 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.
- B. Mineral Dry-Shake Floor Hardener: Factory-packaged dry combination of portland cement, graded quartz aggregate, coloring pigments, and plasticizing admixture. Use coloring pigments that are finely ground, nonfading mineral oxides interground with cement.

1. Colors: As scheduled in Division 01 Section "Design Selections", or where not scheduled, as selected by Architect from manufacturer's full range of standard colors.
  2. Consult with manufacturer's trained technical representative where dry-shake floor hardener will be applied over air-entrained concrete.
  3. Manufacturers and Products:
    - a. Euclid Chemical Co.; Surfex.
    - b. Lambert Corporation; Colorhard.
    - c. L&M Construction Chemicals, Inc.; Quartzplate FF.
- C. Penetrating Liquid Floor Hardener and Sealer: Chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; colorless; that penetrates, hardens, densifies, and seals concrete surfaces. Minimum manufacturer's written warranty of 10 years to effectively harden, densify, and dustproof concrete surfaces.
1. Manufacturer Products, subject to specified written warranty:
    - a. ARDEX Engineered Cements; PC50.
    - b. Curecrete Chemical Co., Inc.; Ashford Formula.
    - c. Euclid Chemical Co.; Euco Diamond Hard.
    - d. L&M Construction Chemicals, Inc.; Seal Hard.
- D. Penetrating Liquid Floor Treatments for Polished Concrete Finish: Refer to Division 03 Section "Polished Concrete".
- E. Chemical Stain: Acidic, water based solution of metallic salts that penetrate and react with chemicals in concrete to produce insoluble color deposits in the pores without pigments or resins.
1. Basis of Design (Product Standard): L.M. Scofield Company; Lithochrome Chemstain; Color as selected by Architect from manufacturer's full range.
- F. Imprinting (Stamping) Tools for Stamped Concrete:
1. Stamp Mats: Semi-rigid polyurethane mats with projecting textured and ridged underside capable of imprinting texture and joint patterns on plastic concrete.
  2. Rollers: Manually controlled, water-filled aluminum rollers with projecting ridges on drum capable of imprinting texture and joint patterns on plastic concrete.
  3. Texture Rollers: Manually controlled, abrasion-resistant polyurethane rollers capable of imprinting texture on plastic concrete.

## **2.5 REPAIR MATERIALS**

- A. Self-Leveling Concrete Underlayment (Non-wear surface):
1. Description: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 in (3 mm) to 1 in (25 mm) and that can be feathered at edges to match adjacent floor elevations. Interior use only, unless exterior application recommended by manufacturer within written literature.
  2. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.

3. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
4. Aggregate: Well-graded, washed sand as recommended by underlayment manufacturer.
5. Compressive Strength: 4,000 psi minimum at 28 days when tested according to ASTM C 109.
6. Substrate Preparation: As recommended by product manufacturer.
7. Basis of Design (Product Standard): Ardex, Inc.; "Ardex K-15".
8. Manufacturers: (Consult manufacturer for specific product and compatibility with substrate conditions. Subject to Architect's and Engineer's review and approval.)
  - a. ARDEX Engineered Cements.
  - b. BASF
  - c. Euclid Chemical Co.
  - d. Sika Corporation.

**B. Self-Leveling Concrete Topping (Wear surface):**

1. Description: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/2 in (12 mm) to 2 in (50 mm). Consult manufacturer for thickness exceeding 2 in (50 mm). Interior use only, unless exterior application recommended by manufacturer within written literature.
2. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
3. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
4. Aggregate: Well-graded, washed gravel, 1/8 in (3 mm) to 3/8 in (10 mm) or coarse sand as recommended by topping manufacturer for specific application thickness. No coarse aggregate permitted for thicknesses of 1 in (25 mm) or less.
5. Compressive Strength: 5,000 psi minimum at 28 days when tested according to ASTM C 109.
6. Substrate Preparation: As recommended by product manufacturer.
7. Basis of Design (Product Standard): ARDEX Engineered Cements; "Ardex SD-T".
8. Manufacturers: (Consult manufacturer for specific product and compatibility with substrate conditions. Subject to Architect's and Engineer's review and approval.)
  - a. ARDEX Engineered Cements.
  - b. BASF
  - c. Euclid Chemical Co.

**C. Epoxy Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Shore A hardness of 80 per ASTM D 2240.**

**D. Overlay and Repair Mortar:**

1. General: Use of overlay and repair mortar shall be in accordance with manufacturer's application limitations, precautions, and directions for use, including but not limited to surface preparation, mixing, placing, curing, and compatibility with substrate conditions.
2. Product types listed below are basis of design, however, it is recognized by Architect/Engineer that high performance cement based overlay/repair mortars are available which may be satisfactory to specific application. Intent is not to omit such products from consideration. Subject to Architect and Engineer's approval prior to use.
3. Epoxy Mortar:

- a. Description: ASTM C 881, acceptable at interior applications only, unless otherwise directed by Engineer; appropriate applications include locations susceptible to high wear or high corrosion.
    - 1) Type I: Acceptable at non-structural applications.
    - 2) Type IV: Acceptable at structural applications.
  - b. Manufacturers: (Consult manufacturer for specific product and compatibility with substrate conditions. Subject to Engineer's review and approval.)
    - 1) ARDEX Engineered Cements.
    - 2) BASF
    - 3) Euclid Chemical Company.
    - 4) Sika Corporation.
4. Polymer Modified Cementitious Mortar:
- a. Description: ASTM C 1059, Type II, acceptable at structural and non-structural applications, interior or exterior.
  - b. Manufacturers: (Consult manufacturer for specific product and compatibility with substrate conditions. Subject to Engineer's review and approval.)
    - 1) ARDEX Engineered Cements.
    - 2) BASF
    - 3) Euclid Chemical Company.
    - 4) Sika Corporation.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive concrete finishing, products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer/fabricator's written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

### **3.4 FINISHING FORMED SURFACES (ACI 347)**

#### **A. Rough-Formed Finish: Class D and C Surfaces.**

1. Definition: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched.
2. Procedure: Remove irregularities including but not limited to fins, ravelings, loose material, and other projections exceeding specified limits as measured within 5 foot length of straightedge by rubbing down, chipping off, filling in with approved repair mortar, or combination thereof to satisfactorily complete Work.
3. Locations and Irregularity Limits:
  - a. Class D: Maximum abrupt or gradual irregularity limited to 1 in (25 mm).
    - 1) Concrete surfaces not exposed to view; such as foundations and crawl spaces.
  - b. Class C: Maximum abrupt or gradual irregularity limited to 1/2 in (12 mm).
    - 1) Concrete surfaces not exposed to public view or concrete surfaces concealed by other construction.

#### **B. Smooth-Formed Finish: Class B and A Surfaces.**

1. Definition: As-cast concrete texture obtained with selected form-facing material, arranged in orderly and symmetrical manner with minimum of seams.
2. Procedure: Repair and patch tie holes and defective areas. Remove irregularities including but not limited to fins, ravelings, loose material, and other projections exceeding specified limits as measured with 5 foot length straightedge by rubbing down, chipping off, filling in with approved repair mortar, or combination thereof to satisfactorily complete Work.
3. Locations and Irregularity Limits:
  - a. Class B: Maximum abrupt or gradual irregularity limited to 1/4 in (6 mm)
    - 1) Concrete surfaces to receive coating or covering material applied directly to concrete, such as waterproofing, dampproofing, or plastering.
  - b. Class A: Maximum abrupt or gradual irregularity limited to 1/8 in (3 mm).
    - 1) Concrete surfaces exposed to public view unless noted or scheduled to receive a higher level of finish.
    - 2) Concrete surfaces to receive coating or covering material applied directly to concrete, such as textured acrylic coating, concrete surfacing compound or other similar systems.

#### **C. Smooth-Rubbed Finish: Architectural Exposed Concrete (AEC).**

1. Procedure: Apply Class A smooth-formed finish as initial step. Not later than one day after formwork is removed, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
2. Locations: Where indicated on drawings.

D. Grout-Cleaned Finish:

1. Procedure: Perform after applying smooth-formed finish treatment. Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part Portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white Portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
2. Locations: Where indicated on drawings.

E. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike-off smooth and finish with texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

### 3.5 FINISHING FLOORS AND SLABS (UNFORMED SURFACES)

A. General: Prior to proceeding with any finishing operation, complete initial placement procedures consisting of deposit in form(s), consolidation, screeding, leveling, bull-floating, and initial re-straightening. Do not commence finishing operation when excess moisture or bleed water remains on surface. Do not wet concrete surfaces during finishing operations.

B. Screeding Concrete:

1. Act of striking off surface of concrete to pre-determined grade conforming to elevations shown on Drawings shall be accomplished with use of rigid screed guides. Use of wet screed guides is to be avoided on elevated surfaces.
2. At elevated placements, metal deck and other formwork continues to deflect for short period after strike off. Subsequent re-straightening of surface often moves concrete paste from over beams into resulting depressions. It is suggested that Contractor plan for initial slab thickness of design depth plus 1/8 in (3mm) (minimum). Intent shall be to satisfactorily plan for sufficient material to re-straighten slab surface and still maintain specified slab thickness and adequate cover over reinforcing steel.
3. Contractor shall include in his bid any additional concrete required to achieve specified slab surface finish tolerance. Finish floor tolerances shall be as specified elsewhere in this Section.
4. Cast-in-Place Concrete Framing System(s):
  - a. Grade for strike off shall be set at predetermined distance above top surface of formwork.
  - b. Minimum slab thickness, as specified on Drawings, shall be maintained throughout slab surface.
  - c. It is anticipated that occasional Local Areas may be identified where actual deflection of formwork during concreting operations differs from that anticipated by Contractor. At such isolated areas, modify procedures by one or combination of following:
    - 1) Modify formwork camber where possible.
    - 2) Where over deflection of formwork occurs, maintain concrete slab design thickness at each end of affected beams and increase slab thickness at mid-span by amount of over deflection experienced.

5. Concrete on Metal Deck over Steel Framing System:

- a. Grade for strike off shall be set at predetermined distance above top surface of steel floor members.
- b. It is anticipated that occasional areas will be identified where actual deflection of steel beams during concreting operations differs from that anticipated by Engineer. At such locations, modify procedures by one or combination of following:
  - 1) Residual Camber after concrete placement: Modify fabricated camber in shop where possible for subsequent member placements having same conditions. Where this is not possible, maintain initial thickness at mid-span and increase slab thickness at each end of beam by 1/2 of amount of residual camber. In case of beam with 1/2 in (12 mm) of residual camber, slab thickness at ends of this beam only might be increased by 1/4 in (6 mm).
  - 2) Over-Deflection of Beam during concrete placement: Modify fabricated camber where possible for subsequent member placements having same conditions. Where this is not possible, two options are suggested:
    - a) Option 1: Attach loose shore to underside of this beam only at midspan. Leave initial gap below shore equal to beam camber. As beam deflects during concrete placement, shore will halt deflection at desired point.
    - b) Option 2: Maintain initial concrete slab thickness at each end of this beam only, and increase slab thickness at mid-span by amount of over deflection experienced.
- c. Provide bench mark on each column for use by finishers as guide when they are completing finishing in these areas. It is suggested that mark be placed at predetermined distance above design grade for use by finishers in the removal of excess material as needed.

C. Scratch Finish:

- 1. Procedure: After placing concrete, finish surface to tolerances of specified overall value of F(F) 15 (floor flatness) and F(L) 13 (floor levelness) when measured according to ASTM E 1155, with minimum local value of F(F) 13 and F(L) 10.
  - a. Slope surfaces uniformly to drains where required.
  - b. While still plastic, texture concrete surface that has been screeded and bull-floated or darbied with stiff brushes, brooms, or rakes to produce surface profile amplitude of 1/4 in (6 mm) in one direction.
  - c. Re-straightening of surface with modified highway straightedge may follow screeding or bull-floating as necessary to maintain flatness/levelness.
  - d. No troweling permitted.
- 2. Locations to receive Scratch Finish:
  - a. Surfaces to receive bonded concrete floor topping and other bonded cementitious finish flooring material excluding thin-set tile.
  - b. Drive ramps.

D. Float Finish:

- 1. Procedures:

- a. After concrete has been placed, consolidated, screeded, and restraightened, concrete shall not be worked further until ready for floating. Begin floating operations when water sheen has disappeared, and/or when mix has stiffened sufficiently to permit proper operation of float.
- b. Floating with power machine equipped with normal trowel blades is not permitted.
- c. Floating with power machine equipped with water attachment for wetting concrete surface during finishing is not permitted.
- d. Consolidate surface with power-driven machine initially equipped with float-shoe blades. Hand float with wood or cork faced floats in locations inaccessible to power-driven machine. Restraighten surface with ten-foot highway straightedge applied at not less than two different angles approximately perpendicular.
- e. Finish surfaces to following tolerances when measured according to ASTM E 1155.
  - 1) Specified Overall Values: F(F) 18 ; F(L) 15
  - 2) Minimum Local Values: F(F) 15 ; F(L) 10
- f. Cut down high spots and fill low spots during this procedure to produce planes checking true under straightedge in any direction. Uniformly slope surfaces to drains.
- g. Follow restraightening operation by final float pass with power machine equipped with "pizza type" metal pan clipped to float blades to uniform, smooth, granular texture.
- h. Pre-plan floating operations sufficiently in advance to avoid over-finishing and incorporating additional water into surface.

2. Locations to receive Float Finish:

- a. Surfaces to receive trowel finish.
- b. Surfaces to be covered with fluid applied or sheet waterproofing.
- c. Surfaces to be covered with built-up or membrane roofing.
- d. Surfaces to receive mortar setting bed for tile flooring.
- e. Surfaces to receive sand-bed terrazzo.
- f. Surfaces composed of air-entrained concrete.

E. Trowel Finish:

- 1. Procedures: Perform after applying float finish. Intent is to perform minimum troweling effort necessary to achieve satisfactory surfaces. Avoid over-troweling of surfaces and working of water into surfaces. Where bleedwater is present prior to troweling, excess water shall be dragged off or removed by absorption with porous material such as burlap. Incorporate steps to prevent "blistering". If blistering occurs during finishing or otherwise becomes evident after placement, re-evaluate and correct finishing operations immediately.
  - a. Perform first trowel finish operation with power-driven trowel, fitted with blades as flat to surface as possible and driven at slow speed, to produce smooth surface which is relatively free of defects but may still contain some trowel marks.
  - b. Additional trowelings with power-driven trowel or by hand troweling may be necessary, with waiting period between each successive troweling effort.
  - c. Perform final troweling with hand trowels after surface has hardened sufficiently to permit final consolidation of surface, free of trowel marks, and uniform in texture and appearance.
  - d. Avoid degree of troweling effort(s) resulting in surfaces which exhibit a sheen or glossy appearance.

- e. Avoid trowel patterns at surfaces exposed to view. Resulting trowel patterns at exposed surfaces are subject to Architect's approval.
  - f. Finish surfaces to following F(F) and F(L) tolerances when measured according to ASTM E 1155:
    - 1) Floor levelness does not apply to slabs placed on unsupported form surfaces, such as slabs over unshored metal deck, and to inclined slabs.
    - 2) Slabs-on-Grade:
      - a) Specified Overall Value: F(F)-25/F(L)-20
      - b) Minimum Local Value: F(F)-17/F(L)-14
      - c) Specified Overall Value: F(F)-35/F(L)-25
      - d) Minimum Local Value: F(F)-25/F(L)-17
    - 3) Elevated Cast-in-Place Concrete Framing System:
      - a) Specified Overall Value: F(F)-25/F(L)-20
      - b) Minimum Local Value: F(F)-17/F(L)-14
      - c) Specified Overall Value: F(F)-30/F(L)-20
      - d) Minimum Local Value: F(F)-25/F(L)-17
    - 4) Elevated Concrete on Metal Deck and Steel Beam Framing System:
      - a) Specified Overall Value: F(F)-25
      - b) Minimum Local Value: F(F)-17
      - c) Specified Overall Value: F(F)-30
      - d) Minimum Local Value: F(F)-25
  - g. Repair defects of sufficient magnitude to telegraph through floor covering by grinding or by application of topping. Refer to Remedy for Out-of-Tolerance Floor Surfaces article below for additional remedial measures.
2. Locations to receive Trowel Finish:
- a. Monolithic slab surfaces exposed to view in finished Work, unless noted otherwise.
  - b. Slab surfaces to be covered with resilient flooring, carpet, paint, or other thin film-finish coating system.

F. Partial Trowel and Fine-Broom Finish:

- 1. Procedures: Apply a "partial trowel" finish. Start partial trowel finish with first trowel operation as described above. Perform second troweling with power trowel or by hand trowel, but only if considered necessary to remove trowel marks from initial trowel which may show through fine-broom finish, or, to achieve proper uniform surface texture ready to receive fine-brooming. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.
- 2. Locations for Partial Trowel and Fine-Broom Finish:
  - a. Surfaces to receive tile flooring installed with thin-set mortar or other adhesive.
  - b. Surfaces to receive traffic bearing membrane/coating.

3. Confirmation: Consult with floor finish supplier and installer to confirm suitability of partial trowel and fine-broom finish specified. Where supplier or installer anticipates or otherwise recommends other surface preparation techniques for product application, (such as sand, bead, or shot blasting), waiver for partial trowel and fine-broom finish requirement may be considered by Architect. Submit written description of proposed surface finishing technique for Architect's review prior to Work. Written description shall include statements from supplier and installer.

G. Broom Finish:

1. Procedures: Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
2. Locations for Broom Finish:
  - a. Exterior concrete platforms and steps.
  - b. Parking garage floors and ramps.
  - c. Where indicated on drawings.

### 3.6 FLOOR AND SLAB TREATMENTS

A. Aggregate Finish:

1. Procedures: Before final floating, apply slip-resistive aggregate finish where indicated. Apply according to manufacturer's written instructions and as follows:
2. Uniformly spread 25 lb/100 sq. ft. (12 kg/10 sq. m) of slip-resistive aggregate over surface in 1 or 2 applications. Tamp aggregate flush with surface, but do not force below surface.
3. After broadcasting and tamping, apply float finish.
4. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate.
5. Locations:
  - a. Where indicated on drawings.

B. Dry Shake Floor Hardener Finish:

1. Procedures:
  - a. Uniformly apply dry shake materials at rate of 100 lb per 100 sq. ft., unless greater amount is recommended by material manufacturer's trained technical representative.
  - b. Cast trial slab, not less than 100 sq. ft. in area and approximately square, to determine actual application rate, color, and finish, as acceptable to Architect. Use same concrete mix, finishing, and curing planned for project areas to receive dry shake floor finish.
  - c. Immediately following first floating operation, uniformly distribute by hand or with mechanical spreader approximately two-thirds of dry shake material over concrete surface, and embed by power floating.
  - d. Follow floating operation with second shake application, uniformly distributing remainder of dry shake material with overlapping applications to ensure uniform color, and embed by power floating.

- e. After broadcasting and floating, apply trowel finish as specified. Cure slab surface with procedure compatible with dry-shake hardener and as recommended by material manufacturer's trained technical representative. Apply curing compound immediately after final finishing.
- 2. Locations:
  - a. Truck dock slab surface.
  - b. Where indicated on drawings.
- C. Penetrating Liquid Floor Hardener and Sealer: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions including preparation, application, precautions, limitations, and compatibility with other surface conditions.
  - 1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
  - 2. Do not apply to concrete that is less than seven days old unless recommended by manufacturer in written literature describing application procedure, but only with prior approval of Architect.
  - 3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.
  - 4. Locations:
    - a. Exposed concrete floors in central energy plants.
    - b. Mechanical rooms not receiving traffic coatings, electrical rooms, housekeeping, storage, and other similar service areas.
    - c. Where indicated on room finish schedule or on drawings, including exposed concrete floors noted or scheduled as having "sealed concrete" or similar wording.
- D. Polished Concrete Floors: Refer to Division 03 Section "Polished Concrete".
- E. Chemical Stain: Provide chemical colored stain finish to concrete surfaces indicated according to manufacturer's written instructions and as follows:
  - 1. Concrete shall be at least one month old, dry, free from dark alkali spots, and clean from plaster, paint, grease, oil, soap, and other foreign matter which would prevent necessary penetration and subsequent reaction of stain solution with concrete surface to be colored.
  - 2. Remove paint stains from concrete with medium grit sandpaper or steel wire brush. Remove oil, wax, and grease by using solution of one pound of tri-sodium-phosphate dissolved in one gallon of water and rinsing well. Remove paint spots with scraper and paint remover that does not have wax or acid base.
  - 3. Apply stain with full brush, being careful to avoid excessive puddling. Brush lightly in circular or figure-eight motion until fizzing action ceases. Do not spread stain solution on new areas after fizzing stops. Rather, remaining liquid shall be brushed back over area just treated. When applying additional stain, it shall be brushed back into wet areas previously stained to avoid lap marks. Edges must be kept wet.
  - 4. After first coat has dried, or if at least eight hours have elapsed since application, second coat shall be applied in same manner as first coat. After last coat of stain has dried, residue and salts shall be removed by wet scrubbing with stiff brush and flushing with clean water until rinse water runs clear. Control runoff of flushing water to prevent damage to surrounding area.
  - 5. Locations:

- a. Where indicated on drawings.

F. Imprinting for Stamped Concrete: One of the following as directed by Architect:

1. Mat Stamping: While initially finished concrete is plastic, accurately align and place stamp mats in sequence. Uniformly load mats and press into concrete to produce required imprint pattern and depth of imprint on concrete surface. Remove stamp mats immediately. Hand stamp edges and surfaces unable to be imprinted by stamp mats.
  - a. Remove unembedded release agent no fewer than three days after stamping concrete. High pressure wash surface and joint patterns, taking care not to damage stamped concrete. Control, collect, and legally dispose of runoff.
2. Tool Stamping: While initially finished concrete is plastic, cover surface with polyethylene film, stretch taut to remove wrinkles, lap sides and ends 3 in (75 mm), and secure to edge forms. Lightly broom surface to remove air bubbles. Accurately align and place stamp tools in sequence and tamp into concrete to produce required imprint pattern and depth of imprint on concrete surface. Remove stamp tools immediately. Hand stamp edges and surfaces unable to be imprinted by stamp tools. Unroll and remove polyethylene film immediately after tool stamping.
  - a. Antiquing Agent: Apply over liquid release agent according to manufacturer's written instructions.
3. Roller Stamping: While initially finished concrete is plastic, cover surface with polyethylene film, stretch taut to remove wrinkles, lap sides and ends 3 in (75 mm), and secure to edge forms. Lightly broom surface to remove air bubbles. Accurately align roller and repeat rolling operation to produce required imprint pattern and depth of imprint on concrete surface. Hand stamp surfaces inaccessible to roller. Unroll and remove polyethylene film immediately after roller stamping.
  - a. Antiquing Agent: Apply over liquid release agent according to manufacturer's written instructions.
4. Locations:
  - a. Where indicated on drawings.

### 3.7 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete for minimum period indicated below from premature drying and excessive cold or hot temperatures.

Cement Type	Minimum Curing Period
Type I Portland Cement	7 days
Type II Portland Cement	10 days
Type III Portland Cement	3 days (when ambient temp. is 73 deg F or higher)
Type IV or V Portland Cement	14 days
Blended Cements	Variable, but, not less than period above for Type of Portland Cement in blended mix.

- B. Curing Time Reduction: Curing times may be reduced from periods noted above at concrete which will have permanent in-service interior exposure to conditioned air if either of following provisions is complied with.
1. When tests are made of field cured cylinders cured by same methods as structure, curing period may be terminated when average compressive strength has attained 75% of specified 28-day compressive strength. Minimum curing period not less than 72 hours.
  2. When temperature of structure concrete is maintained at minimum of 50 deg F (10 deg C) for same length of time required for laboratory cured cylinders of same concrete to reach 85% of specified 28-day compressive strength, curing period may be terminated. Minimum curing period not less than 72 hours.
- C. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions result in rate of evaporation (estimated by ACI 305R, Fig. 2.1.5) approaching 0.2 lb/sq. ft. x h (1 kg/sq/ m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- D. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, columns, walls, and other similar surfaces. If forms remain during curing period, moisture cure after loosening forms. If forms are removed before end of curing period, continue curing by one or a combination of specified curing methods as applicable. Contractor shall select method which is compatible with requirements for subsequent material application on surface.
- E. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces, by one or a combination of specified curing methods as applicable. Contractor shall select method which is compatible with requirements for subsequent material application on surface.
- F. Curing Methods: Cure formed and unformed surfaces by one or a combination of following methods as applicable.
1. Moisture Curing:
    - a. Procedures: Keep concrete surface continuously wet by covering with absorptive cover or by using continuous water-fog spray. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 12 in (300 mm) lap over adjacent absorptive covers. Secure absorptive covers to maintain close contact with concrete surface, withstand wind, and prevent air circulation below cover during entire curing period.
    - b. Precautions: Apply following precautions during moisture curing.
      - 1) Water shall be potable meeting requirements of ASTM C 94.
      - 2) Temperature of supply curing water shall not exceed 10 deg F (-9.4 deg C) warmer than internal temperature of concrete or 90 deg F (32 deg C), whichever is lower.
      - 3) Temperature of supply curing water shall not be lower than 15 deg F (-12.2 deg C) cooler than internal temperature of concrete or 50 deg F (10 deg C), whichever is higher.
      - 4) Discontinue moisture curing 24 hours minimum prior to exposure or anticipated exposure of concrete to freezing ambient temperatures.

- c. Moisture cure concrete surfaces that are to receive the following finishes:
  - 1) Penetrating liquid floor hardener and sealer.
  - 2) Polished concrete.
  - 3) Chemical stain.
- 2. Moisture-Retaining Cover:
  - a. Procedures: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least: 4 in (100 mm) for curing paper; and 12 in (300 mm) for polyethylene film or burlap-polyethylene sheeting, and sealed by waterproof tape or adhesive. Immediately repair holes or tears during curing period using cover material and waterproof tape. Secure moisture-retaining cover to maintain close contact with concrete surface, withstand wind, and prevent air circulation below cover during entire curing period.
  - b. Polyethylene film not permitted at unformed surfaces.
- 3. Curing Compounds:
  - a. Procedures: Apply curing compound to concrete surfaces as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
  - b. Unformed Surfaces at Parking Garages: Apply liquid membrane-forming curing compound.
  - c. Do not use curing compounds which exhibit yellowing or moderate yellowing at surfaces to be permanently exposed in finished Work.
  - d. Removal: If curing compounds are used on surfaces (exterior or interior, formed or unformed) that are scheduled or specified to receive surface-adhered treatment (including but not limited to cementitious toppings/overlays, adhesive applied carpet, resilient flooring, terrazzo, thin-set ceramic tile/stone, wood, coatings, paint, waterproofing, membranes, athletic flooring, epoxy overlay/adhesive, hardeners, sealers, water repellents, or other covering system adhered with water-based adhesive), then the following requirements apply:
    - 1) Remove curing compound no later than 7 days after end of curing period by mechanical bead blast process acceptable to Architect.
    - 2) Allow sufficient additional time after curing compound removal to achieve proper concrete moisture and/or water vapor limitation for successful application of subsequent surface treatment as specified in appropriate surface treatment specification Section.
  - e. Do not use curing compounds at concrete surfaces that are to receive the following finishes:
    - 1) Penetrating liquid floor hardener and sealer.
    - 2) Polished concrete.
    - 3) Chemical stain.

- f. Incorrect Use: If curing compound is incorrectly used on concrete surfaces specified to receive other curing method(s), then mechanically or chemically remove curing compound in its entirety not later than 7 days after end of curing period by pre-approved method(s). Acid etching is not permitted. Method of curing and sealing compound removal shall not result in damaged or otherwise unsuitable surface to receive specified finish material, coating, membrane, or covering and shall be at Contractor's expense. Consult with appropriate surface finish vendor and installer for suitability of curing compound removal method prior to the Work.
  - g. Surfaces with Dry-Shake Hardener: Consult with manufacturer's trained technical representative for product and application of curing compound over surfaces where dry-shake hardener has been applied.
- G. Control of Water after Curing: Control water at all times after curing period. Rewetting after curing period affects drying of hardened concrete with direct affect on application of finish materials applied with adhesives sensitive to moisture and/or water vapor. Control of water includes water at jobsite, and moisture due to rain, ice, or snow. Contractor is responsible for control of water and affects on concrete and material(s) to be applied to hardened concrete.

### **3.8 FLOOR SURFACE TOLERANCES**

- A. Specified Overall Value(s) and Minimum Local Value(s) herein represent minimum floor flatness/levelness criteria for project.
  - 1. Where normal data collection under provisions of ASTM E 1155 indicate possibility of work below these values, additional data collection may be required to confirm extent, or boundary, of defective work at Contractor's expense.
  - 2. When areas are identified as not meeting specified Minimum Local Value(s), such areas are deemed as out-of-tolerance floor surfaces and shall be replaced or repaired in accordance with "Remedy for Out-of-Tolerance Floor Surfaces" below.
- B. Floor Elevation Tolerances:
  - 1. Permissible Vertical Envelope: When tested in accordance with requirements of ASTM E 1155, following percentages of elevation samples on floor slabs at single elevation shall fall within level 3/4 in (19 mm) envelope centered about mean elevation of readings.
    - a. Slabs-on-Grade: 85 percent.
    - b. Elevated Slabs: 80 percent.
  - 2. Permissible Arithmetic Mean Deviation of Floor Samples: Arithmetic mean of these elevation samples shall not deviate from design grade more than following amounts:
    - a. Slabs-on-Grade: 1/4 in (6 mm), plus or minus.
    - b. Elevated Slabs: 1/2 in (12 mm), plus or minus.
- C. Contractor shall take immediate action to correct work that does not meet specified tolerances.

### **3.9 REMEDY FOR OUT-OF-TOLERANCE FLOOR SURFACES**

- A. General:

1. Remedial work, testing, retesting, and consulting services necessary to correct out-of-tolerance floor surfaces shall be at Contractor's expense with no extension to construction schedule.
2. Repair and/or replacement procedures, limits, and products shall be in manner that does not diminish desired appearance or serviceability of structure, and acceptable to Architect/Engineer and Owner. Contractor shall submit detailed work plan for areas where remedial measures are necessary, prior to work, and in accordance with Contractor's submittal "Work Plan for Out of Tolerance Floor Surfaces".

**B. Remedial Measures:**

1. Minimum local areas measuring below specified minimum local value(s) shall be repaired by grinding or by application of topping or underlayment to entire surface of minimum local area, and retested, unless following conditions occur:
  - a. Such area is acceptable to Architect/Engineer and Owner, and written acceptance is provided.
  - b. Repair of such area would diminish desired appearance and/or serviceability of structure, or is in general considered unacceptable to Architect/Engineer and Owner for other reasons, in which case minimum local area(s) shall be replaced and retested.
2. Application of topping or underlayment:
  - a. Prime floor surface as recommended by topping or underlayment manufacturer.
  - b. Add aggregate for thicker areas as recommended by topping or underlayment manufacturer.
  - c. Install in accordance with manufacturer's directions.
  - d. For interior areas which are to have finish flooring, use self-leveling concrete underlayment.
  - e. For areas which will be exposed as wearing surface, use self-leveling concrete topping.

### **3.10 CONCRETE SURFACE REPAIRS**

**A. General:**

1. Locate surface defects where repair is required by visual inspection of formed and unformed surfaces. Mark location in manner that does not cause further defect. Record and maintain record of such defects for Repair Records Submittal.
2. Remove and replace concrete with surface defects if defects cannot be repaired to satisfaction of Architect/Engineer or Owner.
3. Concrete removal shall be with equipment and procedures which will prevent cracking, micro-cracking, and bruising of sound concrete to remain. Follow initial concrete removal process with sandblasting to remove any remaining deleterious effects.
4. Repairs shall be performed by trained installer, experienced with type repair and repair products required.
5. Avoid cutting reinforcement during repairs, but, where reinforcement is encountered, remove concrete so as to expose reinforcement within repair area for 1 in (25 mm) minimum on all sides.
6. Protect freshly applied repair mortars from exposure to direct sunlight, wind, rain, and frost.

7. Repair procedures outlined below are general in nature and not intended as complete repair preparation or installation instructions. Intent is to provide minimum basic repair criteria allowing for flexibility of means/methods based on experience of trained installers.
- B. Surface Defects: Repair and patch surface defects which become evident during construction and warranty periods, when such conditions are exposed to view, or when durability, serviceability, and/or structural integrity of structure is affected by defect. Surface defects requiring attention include, but are not limited to, following.
1. Honeycombs, rock pockets, and voids over 1/4 in (6 mm) in any dimension.
  2. Holes left by tie rods, bolts, or other.
  3. Exposed reinforcing.
  4. Cracks 0.02 in (0.50 mm) wide or wider at interior exposed or non-exposed conditions.
  5. Cracks in excess of 0.01 in (0.25 mm) wide at exterior exposed conditions and/or where water tightness is critical as determined by Architect/Engineer.
  6. Cracks which penetrate completely through member, regardless of width.
  7. Spalls which affect durability, structural integrity, or finish appearance at surfaces exposed to view.
  8. Surface crazing which affects durability, structural integrity, or finish appearance at surfaces exposed to view.
  9. Stains, discolorations, and texture irregularities at surfaces exposed to view which cannot be corrected by cleaning or rubbing processes.
  10. High or low irregularities in unformed surfaces other than as specified for Out-of-Tolerance Floor Surfaces.
- C. Repairing Formed Surfaces:
1. After form removal, cut out honeycombs, rock pockets, and voids more than 1/2 in (12 mm) in any dimension in solid concrete.
    - a. Mark perimeter of area to be removed with straight-line segments forming rectangular or square repair area on formed surface. Intent is for repair area edges to be linear and repair area shape to be parallelogram.
    - b. Saw cut perimeter of repair area to pre-determined repair depth, but not less than 1/2 in (12 mm). Make edges of cuts perpendicular to concrete surface.
    - c. Remove concrete within repair area by appropriate method to obtain exposed aggregate surface with minimum surface profile of 1/8 in (3 mm).
    - d. Clean substrate of dust, dirt, loose concrete, or other bond inhibiting material.
    - e. Dampen prepared substrate with water to saturated surface dry condition, and brush-coat surface with bonding agent. Pre-dampening may be omitted if not required by repair mortar manufacturer.
    - f. Fill and compact with repair mortar before bonding agent has available exceeded pot life.
    - g. Finish repair surface to match plane and texture of adjacent concrete.
    - h. Cure repair surface by moisture retaining cover for minimum period of 72 hours, but not less than period recommended by repair mortar manufacturer.
  2. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
  3. Repair defects on surfaces exposed to view with patching mortar consisting of blend of white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color.

- a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
    - b. Prepare substrate to receive patching mortar same as described above, except, repair depth not less than 1 in (25 mm).
    - c. Compact mortar in place and strike off slightly higher than surrounding surface.
    - d. Cure repair surface with moisture retaining cover for 7 days minimum.
  4. Repair cracks exceeding limitations noted above by high or low pressure epoxy injection procedure acceptable to Architect/Engineer. Gravity flow techniques for epoxy resin repair of cracks not permitted.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. After concrete has cured at least 14 days, correct high areas by removal with mechanical equipment and procedures which will not cause cracking, micro-cracking, or bruising of sound concrete.
  2. Correct localized non-exposed low areas by cutting out low areas to minimum depth of 1/2 in (12 mm) and 1/8 in (3 mm) surface profile. Apply bonding agent and replace with repair mortar. Finish repaired areas to blend into adjacent concrete.
  3. Correct low interior areas scheduled to receive floor coverings with self-leveling concrete underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
  4. Correct low interior areas scheduled to remain exposed with self-leveling concrete topping. Cut out low areas to ensure a minimum repair topping depth of 1/2 in (12 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
  5. Correct low exterior areas to remain exposed with overlay or repair mortar suitable for application. Cut out defective areas to ensure minimum repair mortar depth of 1/2 in (12 mm) and 1/8 in (3 mm) surface profile. Prepare, mix, apply, and cure repair mortar and primer according to manufacturer's written instructions.
  6. Repair defective areas which cannot be satisfactorily repaired, by cutting out defective area in its entirety and replacing with fresh concrete. Remove defective areas with clean, square cuts. Preserve and expose steel reinforcement with at least 1 in (25 mm) clearance all around. Dampen concrete surfaces in contact with fresh concrete and apply bonding agent. Mix fresh concrete of same materials and mix as original concrete unless smaller coarse aggregate necessary for application. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
  7. Repair single holes 1 in (25 mm) or less in diameter with patching mortar. Cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
  8. Repair cracks exceeding limitations noted above by high or low pressure epoxy injection procedure acceptable to Architect/Engineer. Gravity flow techniques for epoxy resin repair of cracks not permitted.
- E. Structural Repairs:
1. Definition: Defects described above at structural load-bearing members where structural integrity of structure is jeopardized or of concern to Engineer.

2. Procedures:

- a. Defects requiring structural repair shall be determined by Engineer.
- b. Perform structural repairs with prior approval of Engineer for method and procedure using specified bonding compound and/or repair materials.

F. Repair methods not specified above may be considered, subject to approval of Architect/Engineer prior to work.

**3.11 JOINT FILLING**

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semi-rigid epoxy joint filler full depth in saw-cut joints and in tooled joints. Overfill joint and trim joint filler flush with top of joint after hardening.

**PART 4 - QUALITY CONTROL**

**4.1 INSPECTION STANDARDS**

- A. Quality control, testing, and inspections shall meet the special inspection requirements of the building code and any local or state provisions.

**4.2 TESTING AGENCY**

- A. Owner will employ and pay a qualified independent testing agency to perform the quality control indicated in this section, including special inspections required by the building code.
- B. Floor Flatness Inspector to perform floor surface profile measurements shall be certified by manufacturer of floor profile measurement apparatus.
- C. Flatness and Levelness Inspection and Reporting for Floor Slabs:
  - 1. Determine flatness and levelness of interior floor slabs designated to receive troweled finish. Data shall be collected in manner consistent with requirements of ASTM E 1155 and using Type II Apparatus.
  - 2. Coordinate with Contractor to establish measurement program and desired lines for data collection, in accordance with requirements of ASTM E 1155.
  - 3. Mark clearly on floor surface beginning point and ending point of each line of data collection.
  - 4. Those lines of data which will be used to study time-dependent behavior of floor will be collected along chalk line which has been established by Inspector. Each chalk line is to be protected in manner which will allow subsequent data to be collected at same locations.
  - 5. Measurements shall be made within 24 hours after completion of concrete finishing operations.
  - 6. Immediately following data collection, Inspector will process data. Contractor will provide Inspector with actual elevation of "Start" and "End" points for each data line marked by Inspector.

7. Within 48 hours of data collection, Inspector will provide Contractor with written report stating results of floor profile measurements and surface analysis for each slab placement. Report(s) shall include following:
  - a. Key plan showing location of data collected.
  - b. Results required by ASTM E 1155.
  - c. Running tabulation of composite FF and FL values for surfaces installed to date.
  - d. Calculated percentage of elevation samples falling within level 3/4 in (19 mm) envelope, centered about mean elevation of samples taken to date at subject floor level(s).
  - e. Comments on possible cause of floor surface deviations noted during analysis of data.
  - f. Recommendations for adjustments in future construction based on analysis of data.

#### **4.3 CONTRACTOR**

- A. Owner's employment of a qualified independent testing agency to perform the testing/inspection services shall not operate to relieve Contractor of responsibility to furnish materials and workmanship in accordance with Contract Documents.
- B. Owner's employment of a qualified independent testing agency to perform the testing/inspection services is for verification and does not prevent Contractor from providing supplemental testing/inspection at Contractor's discretion and expense.
- C. Qualifications of Contractor's Testing/Inspection Personnel: Contractor's personnel performing testing/inspection services are subject to same qualifications as Owner's Testing Agency.
- D. Re-testing of conditions failing to meet specified requirements shall be provided at Contractor's expense.
  1. In the event of differences between Owner's testing agency and Contractor's inspector regarding conformance, such differences shall be brought to the attention of the Architect, Engineer of Record and enforcement agency as part of the resolution.
  2. Where there is no resolution of differences, joint supplemental testing between Owner's testing agency and Contractor's inspector may be required and provided at Contractor's expense.
  3. Additional fees for Architect and Engineer of Record participation in resolution of non-conforming work may be required and provided at Contractor's expense.
- E. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.
  1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.
    - a. Concrete underlayments, self-leveling concrete toppings, and overlay/repair mortars
    - b. Crack repair/injection.

**END OF SECTION**



**SECTION 03 3543**  
**POLISHED CONCRETE**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Work required for this Section includes polished concrete finishing of cast-in-place concrete floor or topping slab including supplementary products necessary to complete the concrete installation.
  - 1. Process includes the application of sealer/hardener and polishing of concrete to specified level of finish.

**1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.

**1.3 INFORMATIONAL SUBMITTALS**

- A. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
- B. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".
- C. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
  - 2. Installer: Submit Manufacturer's certification stating installer is certified to install concrete finishing system.
- D. Maintenance Data: For inclusion in maintenance manual.
  - 1. Include instructions for maintenance of installed work, including methods and frequency recommended for maintaining optimum condition under anticipated use.
  - 2. Include precautions against cleaning products and methods which may be detrimental to finishes and performance.

**1.4 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.

B. Installer Qualifications:

1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.

C. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.

1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect.
  - a. Show typical components and requirements of installation.
  - b. Size: Not less than 6 ft. x 6 ft. (1.8 m x 1.8 m).
2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
  - a. Do not proceed with remaining work until workmanship, level of polished sheen, aggregate exposure, and dye color, is approved by Architect.
4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

## 1.5 PRE-INSTALLATION CONFERENCE

A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

1. Participants:
  - a. Architect.
  - b. Contractor, including superintendent.
  - c. Installer, including project manager and supervisor.
  - d. If requested, Manufacturer's qualified technical representative.
  - e. Installers of other construction interfaced with Work.
2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
  - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.

- b. Review Contract Document requirements.
- c. Review approved submittals.
- d. Review inspection and testing requirements.
- e. Review environmental conditions and procedures for coping with unfavorable conditions.

1) Cast-in-place concrete requirements:

- a) Coordination of curing methods/procedures.
- b) Protection of concrete substrate during construction and prior to polishing process
- c) Phasing and scheduling for each step of grinding, honing and polishing operations.
- d) Application of color.
- e) Application of liquid applied products.
- f) Protecting polished concrete floors after polishing work is complete.

- f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.

3. Record discussions, including decisions and agreements, and prepare report.

## 1.6 PROJECT CONDITIONS

- A. Damage and Stain Prevention: Take precautions to prevent damage and staining of concrete surfaces to be polished.

- 1. Prohibit use of markers, spray paint, and soapstone.
- 2. Prohibit improper application of liquid membrane film forming curing compounds.
- 3. Prohibit vehicle parking over concrete surfaces.
- 4. Prohibit pipe-cutting operations over concrete surfaces.
- 5. Prohibit storage of any items over concrete surfaces for not less than 28 days after concrete placement.
- 6. Prohibit ferrous metals storage over concrete surfaces.
- 7. Protect from petroleum, oil, hydraulic fluid, or other liquid dripping from equipment working over concrete surfaces.
- 8. Protect from acids and acidic detergents contacting concrete surfaces.
- 9. Protect from painting activities over concrete surfaces.

- a. Do not allow protective tapes to come into contact with concrete.

- B. Environmental Limitations: Comply with manufacturers written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting performance.

## 1.7 COORDINATION

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
- B. Available Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those listed.
- C. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

### **2.3 FLOOR AND SLAB TREATMENTS**

- A. Penetrating Liquid Floor Treatments for Polished Concrete Finish: Clear, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, densifies and is suitable for polished concrete surfaces.
  - 1. Manufacturers and Products:
    - a. Advanced Floor Products Retro-Plate System: Retro-Plate 99.
    - b. ARDEX Engineered Cements; PC Finish.
    - c. L&M Construction Chemicals, Inc.: FGS Hardener Plus.
    - d. QuestMark, a division of CentiMark Corporation: DiamondQuest Densifying Impregnator Application.
  - 2. Basis of Design: Advanced Floor Products Retro-Plate System; Retro-Plate 99 Sealer/Hardener/Densifier Agent.
- B. Dye: Non-film forming soluble colorant dissolved in a carrier designed to penetrate and alter coloration and appearance of a concrete floor surface without a chemical reaction.
  - 1. Basis of Design (Product Standard): Ameripolish; Polished Concrete Solvent Dye System.
    - a. Color: As scheduled or as indicated in Design Selections.
- C. Stainguard Impregnating Stain Protection: Non film forming stain and food resistant penetrating sealer designed to be applied to densified and polished concrete which meets the requirements of OSHA for slip resistance as tested by ASTM D 2047 and stain resistance of ASTM D 1308.

1. Basis of Design (Product Standard): Advanced Floor Products Retro-Plate System; Retro-Guard.

## **2.4 ACCESSORIES**

- A. Repair Material: Product designed and recommended for crack repair and surface imperfections. Material shall remain bonded and adhered after polishing concrete surface and provide abrasion resistance equal to or greater than the surrounding concrete substrate.
- B. Grout Material: A thin mortar used for filling voids:
  1. Epoxy, urethane, polyurea, or polyaspartic resins.
  2. Latex or acrylic binders mixed with cement dust from previous grinding steps.
  3. Silicate binders mixed with cement dust from previous grinding steps.
- C. Protective Cover: Non-woven, puncture and tear resistant, polypropylene fibers laminated with a multi-ply, textured membrane, not less than 18 mils in thickness.
  1. Basis of Design: McTech Group; EZcover Protective Covering.
- D. Joint Filler: Polyurea sealant, VOC compliant, non-staining compatible with polished concrete, Shore A-85.
  1. Basis of Design (Product Standard): Advanced Floor Product; CreteFill Pro 85 MI Moisture Insensitive.

## **2.5 POLISHING EQUIPMENT**

- A. Field Grinding and Polishing Equipment: Multiple head, counter rotating, various size and weights, with diamond tooling affixed to the head for the purpose of grinding concrete.
  1. Dry grinding, honing, or polishing, use dust extraction equipment with flow rate suitable for dust generated, with squeegee attachments.
  2. Wet grinding, honing, or polishing, use slurry extraction equipment suitable for slurry removal and containment prior to proper disposal.
- B. Edge Grinding and Polishing Equipment: Hand-held or walk-behind machines producing results matching field grinding and polishing equipment.
- C. Burnishing Equipment: High speed walk-behind or ride-on burnisher equipped with burnishing pads, capable of generating 2600 revolutions per minute with sufficient head pressure of not less than 20 pounds to raise floor temperature by 20 deg F (minus 7 deg C).
- D. Diamond Tooling: Abrasive tools containing industrial grade diamonds within a bonded matrix (such as metallic, resinous, ceramic, etc.) attached to rotating heads.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive concrete finishing, products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
  - 1. Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, paint splatter, and other contaminants incompatible with liquid applied products and polishing.
    - a. Use manufacturers recommended cleaning products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
  - 1. Verify that concrete substrates are dry and free of curing compounds and other materials that may interfere with finish installation.
  - 2. Determine dryness characteristics by performing the following tests as recommended by flooring manufacturer.

### **3.4 FLOOR AND SLAB TREATMENTS**

- A. Dye or Pigmented Micro Stain Application:
  - 1. Apply solution by methods and techniques required by manufacturer to produce finish matching approved field mock-ups.
  - 2. Maintain wet edge, working newly applied solution into edges of adjacent wet edges of previously treated surfaces.
  - 3. Maintain consistent saturation throughout application.
  - 4. Avoid splashing, dripping, or puddling of solution on adjacent substrates.
  - 5. When color matches approved mock-ups, neutralize as required by manufacturer.

- B. Polished Concrete Floors: Perform all polishing procedures to ensure a consistent appearance from wall to wall.
- C. Initial Grinding:
1. Begin grinding in one direction using sufficient size equipment and diamond tooling to meet specified aggregate exposure class.
  2. Make sequential passes with each pass perpendicular to previous pass using finer grit tool with each pass, up to 100 grit metal bonded tooling.
  3. Achieve maximum refinement with each pass before proceeding to finer grit tools.
  4. Clean floor thoroughly after each pass using dust extraction equipment properly fitted with squeegee attachment or walk behind auto scrubber suitable to remove all visible loose debris and dust.
  5. Continue grinding until aggregate exposure matches approved field mock-ups.
- D. Treating Surface Imperfections:
1. Mix patching compound or grout material with dust created by grinding operations, manufacturer's tint, or sand to match color of adjacent concrete surfaces.
  2. Fill surface imperfections including, but not limited to, holes, surface damage, small and micro cracks, air holes, pop-outs, and voids with grout to eliminate micro pitting in finished work.
  3. Work compound and treatment until color differences between concrete surface and filled surface imperfections are not reasonably noticeable when viewed from 10 feet away under lighting conditions that will be present after construction.
- E. Liquid Sealer/Hardener/Densifier Application: Apply undiluted to point of rejection, remove excess liquid, and allow curing according to manufacturer's instructions.
- F. Grout Grinding:
1. Use grinding equipment and appropriate grit and bond diamond tooling.
  2. Apply grout, forced into the pore structure of the concrete substrate, to fill surface imperfections.
  3. Clean floor thoroughly after each pass using dust extraction equipment properly fitted with squeegee attachment or walk behind auto scrubber suitable to remove all visible loose debris and dust.
- G. Honing:
1. Hone concrete in one direction and make as many sequential passes as required to remove scratches, each pass perpendicular to previous pass, up to 400 grit tooling reaching maximum refinement with each pass before proceeding to finer grit tooling.
  2. Clean floor thoroughly after each pass using dust extraction equipment properly fitted with squeegee attachment or walk behind auto scrubber suitable to remove all visible loose debris and dust.
- H. Polishing for Level 1 - Low Gloss Appearance:
1. Begin polishing in one direction starting with grit range of 100 or less.
  2. Make sequential passes with each pass perpendicular to previous pass using finer grit tooling with each pass until the specified level of gloss has been achieved.

3. Achieve maximum refinement with each pass before proceeding to finer grit pads.
4. Clean floor thoroughly after each pass using dust extraction equipment properly fitted with squeegee attachment or walk behind auto scrubber suitable to remove all visible loose debris and dust.
5. Stainguard Protection: Mix, thin and uniformly apply two coats in crosshatch pattern according to manufacturer's instructions. Final film thickness should be less than .05 mils after cure. Burnish and heat to 90 F degrees, each coat.
6. Final Polish: Using burnishing equipment and finest grit diamond impregnated abrasive pads, burnish to uniform reflective sheen matching approved field mock-up.

I. Polishing for Level 2 - Medium Gloss Appearance:

1. Begin polishing in one direction starting with grit range of 100 to 400.
2. Make sequential passes with each pass perpendicular to previous pass using finer grit tooling with each pass until the specified level of gloss has been achieved.
3. Achieve maximum refinement with each pass before proceeding to finer grit pads.
4. Clean floor thoroughly after each pass using dust extraction equipment properly fitted with squeegee attachment or walk behind auto scrubber suitable to remove all visible loose debris and dust.
5. Stainguard Protection: Mix, thin and uniformly apply two coats in crosshatch pattern according to manufacturer's instructions. Final film thickness should be less than .05 mils after cure. Burnish and heat to 90 F degrees, each coat.
6. Final Polish: Using burnishing equipment and finest grit diamond impregnated abrasive pads, burnish to uniform reflective sheen matching approved field mock-up.

J. Polishing for Level 3 - High Gloss Appearance or Level 4 - Very High Gloss Appearance:

1. Begin polishing in one direction starting with grit range of 800 and higher.
2. Make sequential passes with each pass perpendicular to previous pass using finer grit tooling with each pass until the specified level of gloss has been achieved.
3. Achieve maximum refinement with each pass before proceeding to finer grit pads.
4. Clean floor thoroughly after each pass using dust extraction equipment properly fitted with squeegee attachment or walk behind auto scrubber suitable to remove all visible loose debris and dust.
5. Stain Protection: Uniformly apply and remove excessive liquid according to manufacturer's instructions. Final film thickness should be less than .05 mils after cure.
6. Final Polish: Using burnishing equipment and finest grit abrasive pads, burnish to uniform reflective sheen matching approved field mock-up.

K. Final Polished Concrete Floor Finish with Aggregate Exposure:

1. Aggregate Exposure Class A - Cream Finish: Polish Portland cement paste resulting in little or no aggregate exposure.
2. Aggregate Exposure Class B - Fine / Sand Aggregate Finish: Remove not more than 1/16 in (1.5 mm) of concrete surface by grinding and polishing resulting in majority of exposure displaying fine aggregate with no, or small amount of, medium aggregate at random locations.
3. Aggregate Exposure Class C - Medium Aggregate Finish: Remove not more than 1/8 in (3 mm) of concrete surface by grinding and polishing resulting in majority of exposure displaying medium aggregate with no, or small amount of, large aggregate at random locations.

4. Aggregate Exposure Class D - Large Aggregate Finish: Remove not more than 1/4 in (6 mm) of concrete surface by grinding and polishing resulting in majority of exposure displaying large aggregate with no, or small amount of, fine aggregate at random locations
5. Finished Gloss Level 1 - Low Gloss Appearance:
  - a. Procedure: Recommended not less than 4 step process with full refinement of each diamond tool with one application of densifier.
  - b. Gloss Measurement: Determine the specular gloss by incorporating the following:
    - 1) Reflective Clarity Reading: Not less than 20 according to ASTM D5767 prior to the application of sealers.
    - 2) Reflective Sheen Reading: Not less than 15 according to ASTM D523 prior to the application of sealers.
6. Finished Gloss Level 2 - Medium Gloss Appearance:
  - a. Procedure: Recommended not less than 4 step process with full refinement of each diamond tool with one application of densifier.
  - b. Gloss Measurement: Determine the specular gloss by incorporating the following:
    - 1) Reflective Clarity Reading: Not less than 55 according to ASTM D5767 prior to the application of sealers.
    - 2) Reflective Sheen Reading: Not less than 25 according to ASTM D523 prior to the application of sealers.
7. Finished Gloss Level 3 - High Gloss Appearance:
  - a. Procedure: Recommended not less than 4 steps with full refinement of each diamond tool with one application of densifier.
  - b. Gloss Measurement: Determine the specular gloss by incorporating the following:
    - 1) Reflective Clarity Reading: Not less than 65 according to ASTM D5767 prior to the application of sealers.
    - 2) Reflective Sheen Reading: Not less than 35 according to ASTM D523 prior to the application of sealers.
8. Finished Gloss Level 4 - Very High Gloss Appearance:
  - a. Procedure: Recommended not less than 4 steps with full refinement of each diamond tool with one application of densifier.
  - b. Gloss Measurement: Determine the specular gloss by incorporating the following:
    - 1) Reflective Clarity Reading: Not less than 85 according to ASTM D5767 prior to the application of sealers.
    - 2) Reflective Sheen Reading: Not less than 50 according to ASTM D523 prior to the application of sealers.

### **3.5 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.
  - 1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.

### **3.6 PROTECTION**

- A. Covering: After completion of polishing, protect polished floors from subsequent construction activities with protective covering.

### **3.7 FINISH SCHEDULE:** Reference Drawings.

**END OF SECTION**

## **SECTION 03 4500**

### **ARCHITECTURAL PRECAST CONCRETE**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Plant precast reinforced architectural concrete units and supplementary items necessary for installation.
  - 1. Architectural precast concrete cladding units.

##### **1.2 DELEGATED ENGINEERING REQUIREMENTS**

- A. Contract Documents Design Intent: Drawings and Specifications indicate design intent for products and systems and do not necessarily indicate or specify total Work required. Contract Documents shall not be construed as an engineered design; furnish and install all Work required for a complete installation.
- B. Delegated Engineering Responsibility: Contractor shall employ a qualified professional engineer to provide engineering for products and systems including attachment to building structure required to meet design intent of Contract Documents.
  - 1. Preparation of structural analysis data including engineering calculations, shop drawings and other submittals signed and sealed by the qualified professional engineer.
- C. Delegated Engineering Professional Qualifications: Professional engineer legally authorized to practice in jurisdiction where Project is located and experienced in providing engineering services of kind indicated for products and systems similar to this Project and has a record of successful in-service performance.
- D. Coordination of Work:
  - 1. Product Variations: In the event of minor differences between products and systems of acceptable or available manufacturers, Contractor shall notify Architect of such differences and resolve conflicts in a timely manner. Failure of Contractor to provide notification shall be construed as acceptance of conditions indicated, and changes caused by minor differences between products and Contract Documents shall be included in the Work at no additional cost to Owner.
  - 2. Allowable Adjustments: Minor dimension and profile adjustments may be made in interest of fabrication or erection methods or techniques or ability to satisfy design intent, provided design intent is maintained as determined by Architect. Proposed deviations shall include a detailed analysis of impact to adjacent substrates or other building systems, including related design or construction cost impacts. If accepted by Architect, deviations causing changes in materials, constructability, substrates, or conditions shall be included in the Work at no additional cost to Owner.

### **1.3 ACTION SUBMITTALS**

- A. Product Data: Manufacturer/fabricator's technical literature for each product and system indicated.
  - 1. Include manufacturer/fabricator's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Design Mixtures: Manufacturer/fabricator's detailed ingredients list for each concrete mixture. Include compressive strength and water-absorption tests.
- C. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work. Indicate details at building corners.
  - 1. Indicate separate face and backup mixture locations and thicknesses.
  - 2. Indicate welded connections by AWS standard symbols. Detail loose and cast-in hardware and connections.
  - 3. Indicate locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.
  - 4. Indicate locations, extent, and treatment of dry joints if two-stage casting is proposed.
  - 5. Indicate relationship of units to adjacent materials.
  - 6. Indicate joints, reveals, and extent and location of each surface finish.
  - 7. Thin Masonry Facing Units: Indicate locations and details of thin masonry facing units, including corner units, special shapes, and joint treatments.
  - 8. Stone Facing Units: Indicate locations and details of stone facing units, anchors, and joint treatments.
  - 9. Design Modifications: If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and Shop Drawings. Do not adversely affect the appearance, durability, or strength of units when modifying details or materials and maintain the general design concept.
- D. Concrete-Faced Unit Samples for Verification Purposes: Exposed surfaces of concrete-faced units for each type of finish indicated, in sets of 3, illustrating full range of finish, color, and texture variations expected; approximately 12 in by 12 in by 2 in (300 mm by 300 mm by 50 mm).
- E. Thin Masonry Facing Unit Samples for Verification Purposes: Exposed surfaces of masonry-faced units for each type of finish indicated, in sets of 3, illustrating full range of color and texture variations expected; approximately 12 in by 12 in by 2 in (300 mm by 300 mm by 50 mm).
- F. Stone Facing Unit Samples for Verification Purposes: Exposed surfaces of stone-faced units for each type of finish indicated, in sets of 3, illustrating full range of color and texture variations expected; approximately 12 in by 12 in by 2 in (300 mm by 300 mm by 50 mm).

### **1.4 INFORMATIONAL SUBMITTALS**

- A. Welding Certifications: Qualification certificates required by "Quality Assurance" Article. Include names of firms and personnel certified.
- B. Material Certificates: For the following items, signed by manufacturers:
  - 1. Cementitious materials.
  - 2. Reinforcing materials.

3. Admixtures.
  4. Bearing pads.
  5. Structural-steel shapes and hollow structural sections.
  6. Thin Masonry Facing Units: Brick units and accessories.
  7. Stone Facing Units: Stone anchors.
- C. Delegated Engineering Calculations: Informational submittal for products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation; test reports are not acceptable substitute for calculations.
- D. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
1. Results that materials, including water, in concrete mix are free of ferrous or other material which will cause surface staining during curing operations or upon exposure to weather.
  2. Results that aggregates have a stain index of less than 20 according to ASTM C 641.
- E. Source Quality Control Test Reports: Reports from fabricator required by "Source Quality Control" Article.
- F. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control" Article.
- G. Qualification Data:
1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
  2. Submit verification that manufacturer/fabricator is a participant in one of the required certification programs as specified.

## **1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 10 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
1. Certification Program Participant: Participates in one of following:
    - a. PCI's plant certification program and designated a PCI-certified plant for Group A, Category A1 - Architectural Cladding and Load Bearing Units.
    - b. APA's "Plant Certification Program for Production of Architectural Precast Concrete Products" and designated an APA-certified plant.
- B. Installer Qualifications:
1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
  3. Manufacturer/Fabricator Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer/fabricator to install products.

- C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
- D. Design Standards: Comply with ACI 318 (ACI 318M) and design recommendations of PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of architectural precast concrete units indicated.
- E. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 117, "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products."
- F. Welding: Qualify procedures and personnel according to AWS qualification requirements and following:
  - 1. AWS D1.1/D.1.1M, "Structural Welding Code - Steel".
  - 2. AWS D1.4, "Structural Welding Code - Reinforcing Steel".
- G. Pre-Production Sample Units: After sample acceptance and before fabricating architectural precast concrete units, produce sample units for review by Architect. Provide as many sample units as required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Use materials and installation methods indicated for the completed Work.
  - 1. Produce a minimum of 2 field sample units approximately 16 sq ft (1.5 sq m) in area for review. Incorporate full-scale details of architectural features, finishes, textures, reveals, and transitions in sample units.
  - 2. Locate field sample units at site in locations indicated or, if not indicated, as directed by Architect.
  - 3. Damage part of an exposed-face surface for each finish, color, and texture and demonstrate adequacy of repair techniques proposed for repair of surface blemishes.
  - 4. After acceptance of repair technique, maintain one field sample unit at fabricator's plant and one at site in an undisturbed condition as a standard for judging the completed Work.
  - 5. Demolish and remove field sample units when directed by Architect.
- H. Range Sample Units: After pre-production sample unit acceptance and before fabricating units, produce a minimum of 3 sets of range samples, approximately 6 sq ft (1.5 sq m) in area, representing anticipated range of each color and texture on Project's units. After acceptance of range samples, retain one set of range samples at site and send remaining range sample sets to manufacturer/fabricator's plant for color and texture approval reference.
- I. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.
  - 1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.
    - a. Show typical components, attachments to building structure, and requirements of installation.
  - 2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
  - 3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.

4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

## **1.6 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.
  1. Participants:
    - a. Architect.
    - b. Contractor, including superintendent.
    - c. Installer, including project manager and supervisor.
    - d. If requested, Manufacturer's qualified technical representative.
    - e. Installers of other construction interfaced with Work.
  2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
    - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
    - b. Review Contract Document requirements.
    - c. Review approved submittals.
    - d. Review inspection and testing requirements.
    - e. Review environmental conditions and procedures for coping with unfavorable conditions.
    - f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
  3. Record discussions, including decisions and agreements, and prepare report.

## **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Preparation for Shipping: Apply water repellent to units as specified in "Fabrication" Article in this Section before transporting them to the Project.
- B. Delivery: Deliver units in such quantities and at such times to limit unloading units temporarily on ground. Support units during shipment on nonstaining shock-absorbing material.
- C. Storage: Store units with adequate dunnage and bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping, or other physical damage.
- D. Handling: Handle and transport units in a position consistent with their shape and design in order to avoid excessive stresses which would cause cracking or damage. Lift and support units only at designated points shown on Shop Drawings.

## **1.8 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## 1.9 SEQUENCING

- A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction without delaying the Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS AND PRODUCTS

- A. Available Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those listed.

### 2.2 MATERIALS, GENERAL

- A. Single Source Responsibility: Furnish each type of product from single manufacturer/fabricator. Provide secondary materials only as recommended by manufacturer/fabricator of primary materials.

### 2.3 PERFORMANCE REQUIREMENTS

- A. General Performance: Engineer products and systems to withstand loads within limits of allowable working stresses of the materials involved under conditions indicated and without permanent deformation or failure of materials.
- B. Design Loads: Engineer to withstand design loads including but not limited to gravity, wind, seismic, and erection design loads and thermal movements established by authorities having jurisdiction, applicable local building codes and as indicated.
  - 1. Structural Movement: Engineer to withstand movements of structure including, but not limited to, drift, twist, column shortening, long-term creep and deflection from uniformly distributed and concentrated live loads. Contractor shall obtain required design data and identify movements accommodated on submittal drawings.
    - a. Accommodate plus or minus 3/8 in (10 mm) differential vertical deflection of floors.
- C. Thermal Movements: Engineer products and systems to accommodate thermal movements of supporting elements resulting from the following maximum change (range) in ambient and surface temperatures without buckling, damaging stresses, damaging loads on fasteners, failure of operating units to function properly, and other detrimental effects.
  - 1. Temperature Change (Range): 120 deg F (49 deg C), ambient; 180 deg F (82 deg C), material surfaces.
- D. Dimensional Tolerances: Engineer products and systems to accommodate dimensional tolerances of framing members and adjacent construction.
- E. ~~Fire-Resistance Rating: Where indicated, provide architectural precast concrete units whose fire resistance and minimum thicknesses to provide fire rating has been calculated and is acceptable to authorities having jurisdiction.~~
- F. Building Maintenance Equipment: Engineer units supporting building maintenance equipment to resist pull-out and horizontal shear forces transmitted from equipment.

- G. ~~Vehicular Impact Loads: Engineer precast units acting as vehicular barriers for passenger cars to resist a single 6000 lb (26.7 kN) service load and 10,000 lb (44.5 kN) ultimate load applied horizontally in any direction to the unit, with anchorages or attachments capable of transferring this load to the structure. Engineer units assuming the load to act at a height of 18 in (450 mm) above the floor or ramp surface on an area not to exceed 1 sq ft (0.93 sq m).~~
- H. ~~Hurricane Requirements: Engineer to withstand effects of cyclic wind pressures and windborne debris.~~

## **2.4 MOLD MATERIALS**

- A. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that will provide continuous and true precast concrete surfaces within fabrication tolerances indicated; non-reactive with concrete and suitable for producing required finishes.
- B. Mold-Release Agent: Commercially produced liquid-release agent that will not bond with, stain or adversely affect concrete surfaces and will not impair subsequent surface or joint treatments of concrete.
- C. Form Liners: Units of face design, texture, arrangement, and configuration indicated. Furnish with manufacturer/fabricator's recommended liquid-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent surface or joint treatments of concrete.

## **2.5 REINFORCING MATERIALS**

- A. Reinforcing Bars: One of both of the following as required:
1. Reinforcing Bars: ASTM A 615 / A 615M, Grade 60 (Grade 420), deformed.
  2. Low-Alloy-Steel Reinforcing Bars: ASTM A 706 / A 706M, deformed.
- B. ~~Galvanized Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), or ASTM A 706/ A 706M, deformed bars, ASTM A 767/A 767M, Class II zinc coated, hot dip galvanized, and chromate wash treated after fabrication and bending.~~
- C. Steel Bar Mats: ASTM A 184 / A 184M, fabricated from ASTM A 615 / A 615M, Grade 60 (Grade 420) or ASTM A 706 / A 706M, deformed bars, assembled with clips.
- D. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn or galvanized steel wire into flat sheets.
- E. Deformed-Steel Welded Wire Reinforcement: ASTM A 497 / A 497M, flat sheet.
- F. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 117.

## **2.6 CONCRETE MATERIALS**

- A. Portland Cement: ASTM C 150, Type I or Type III, gray for non-exposed backup concrete, unless otherwise indicated.
1. For surfaces exposed to view in finished structure, mix gray, white, tan, or a combination to produce exposed finish color selected, of same type, brand, and mill source.

- B. Supplementary Cementitious Materials: Not to be used in face mixture; allowed in back of unit mixture only
  - 1. Fly Ash: ASTM C 618, Class C or F, with maximum loss on ignition of 3 percent.
  - 2. Silica Fume Admixture: ASTM C 1240, with optional chemical and physical requirement.
  - 3. Metakaolin Admixture: ASTM C 618, Class N.
  - 4. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- C. Normal-Weight Aggregates: Except as modified by PCI MNL 117, ASTM C 33, with coarse aggregates complying with Class 5S. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.
  - 1. Face-Mixture-Coarse Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining. Uniformly or gap graded to match approved sample.
  - 2. Face-Mixture-Fine Aggregates: Selected, natural or manufactured sand of same material as coarse aggregate, unless otherwise approved by Architect.
- D. Coloring Admixture: ASTM C 979, synthetic or natural mineral-oxide pigments or colored water-reducing admixtures, temperature stable, non-fading, and alkali resistant.
- E. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 117.
- F. Air-Entraining Admixture: ASTM C 260, certified by manufacturer/fabricator to be compatible with other required admixtures.
- G. Chemical Admixtures: Certified by manufacturer/fabricator to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.

## **2.7 STEEL CONNECTION MATERIALS**

- A. Carbon-Steel Shapes and Plates: ASTM A 36 / A 36M.
- B. Carbon-Steel-Headed Studs: ASTM A 108, AISI 1018 through AISI 1020, cold finished, AWS D1.1/D1.1M, Type A or B, with arc shields and with minimum mechanical properties of PCI MNL 117, Table 3.2.3.
- C. Carbon-Steel Plate: ASTM A 283 / A 283M.
- D. High-Strength, Low-Alloy Structural Steel: ASTM A 572/A 572M.
- E. Carbon-Steel Structural Tubing: ASTM A 500, Grade B.
- F. Deformed-Steel Wire or Bar Anchors: ASTM A 496 or ASTM A 706/A 706M.
- G. Carbon-Steel Bolts and Studs: ASTM A 307, Grade A / ASTM F 568M, Property Class 4.6; carbon-steel, hex-head bolts and studs; carbon-steel nuts, ASTM A 563 / A 563M; and flat, unhardened steel washers, ASTM F 844.
- H. Zinc-Coated Finish: For steel items and connections exposed to exterior and unconditioned areas, apply zinc coating by hot-dip process according to ASTM A 123/A 123M or ASTM A 153/A 153M.

1. For steel shapes, plates, and tubing to be galvanized, limit silicon content of steel to less than 0.03 percent or to between 0.15 and 0.25 percent or limit sum of silicon and 2.5 times phosphorous content to 0.09 percent.
  2. Galvanizing Repair Paint: High-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035A or SSPC-Paint 20.
- I. Shop-Primed Finish: For steel items and connections exposed to interior and conditioned areas, prepare surfaces of non-galvanized steel items, except those surfaces to be embedded in concrete, according to requirements in SSPC-SP 3 and shop-apply lead- and chromate-free, rust-inhibitive primer, complying with performance requirements in MPI 79 or SSPC-Paint 25 according to SSPC-PA 1.
  - J. Welding Electrodes: Comply with AWS standards.
  - K. Accessories: Cast-in structural steel anchors, inserts, plates, angles, clips, hangers, shims, bearing pads, and other similar accessories required to install units.

## **2.8 GROUT MATERIALS**

- A. Nonmetallic, Non-shrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, Portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107 of consistency suitable for application within a 30-minute working time.

## **2.9 GUTTER DRAINAGE SYSTEM**

- A. Gutter drainage system at back of units may be either prefabricated silicone system or fabricated galvanized sheet steel system as indicated on the Drawings.
- B. Prefabricated Silicone Gutter Drainage System: Flame-resistant extruded silicone collection channel system used to collect moisture or condensation on the back side of the units. Include accessories such as end dams, weep baffles and silicone weeps as necessary to drain collected moisture to the exterior of the building.
  1. Available Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, manufacturers offering products that may be incorporated into the Work include but are not limited to those listed below:
    - a. Basis of Design: 2DS; "Secondary Drainage Systems - Precast".
- C. Fabricated Galvanized Sheet Steel Gutter Drainage System: Galvanized sheet steel collection channel system used to collect moisture or condensation on the back side of the units. Include accessories such as end dams, weep baffles, and silicone weeps as necessary to drain collected moisture to the exterior of the building.
  1. Zinc-Coated (Galvanized) Sheet Steel: ASTM A 653, G90 coating designation; structural quality, not less than 0.0312 in (0.79 mm) (20 gage) unless otherwise indicated.
  2. Solder for Galvanized Sheet Steel: ASTM B 32, 60 percent lead and 40 percent tin with low antimony, as recommended by manufacturer.
  3. Fabricate gutter drainage system to cross section indicated with clips and accessories required for secure watertight installation. Meet recommendations of SMACNA for fabrication details and metal thicknesses.

- D. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.
- E. Joint Sealant: Silicone construction sealant as specified in Division 07 Section "Joint Sealants".

## **2.10 CONCRETE MIXTURES**

- A. Mix Designs: Prepare design mixtures for each type of precast concrete required.
  - 1. Limit use of fly ash and silica fume to 20 percent of Portland cement by weight; limit metakaolin and silica fume to 10 percent of Portland cement by weight. Not allowed in face of unit mix.
- B. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at architectural precast concrete fabricator's option.
- C. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 (ACI 318M) or PCI MNL 117 when tested according to ASTM C 1218/C 1218M.
- D. Normal-Weight Concrete Mixtures: Proportion face and backup mixtures by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:
  - 1. Compressive Strength: 5000 psi (34.5 MPa) minimum at 28 days.
  - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
- E. Water Absorption: 6 percent by weight or 14 percent by volume according to PCI MNL 117.
- F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 117.
- G. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.

## **2.11 MOLD FABRICATION**

- A. Molds: Accurately construct molds, mortar tight, of sufficient strength to withstand pressures due to concrete-placement operations and temperature changes and for prestressing and detensioning operations. Coat contact surfaces of molds with release agent before reinforcement is placed. Avoid contamination of reinforcement and prestressing tendons by release agent.
  - 1. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and supports to maintain stability of liners during concrete placement. Coat form liner with form-release agent.
- B. Maintain molds to provide completed units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.
  - 1. Form joints are not permitted on faces exposed to view in the finished Work.
  - 2. Edges and corners shall be uniformly chamfered or radius as indicated on the Drawings.

## **2.12 FABRICATION**

- A. Fabrication Quality Standards: In addition to standards listed elsewhere, comply with following, unless otherwise specified in this Section:
  - 1. PCI MNL 117.
  - 2. Accepted submittals.
  - 3. Contract Documents.
- B. General: Fabricate units straight and true to size and shape with exposed edges and corners precise and true so each finished unit complies with fabrication quality standard, product tolerances, and position tolerances for cast-in items.
- C. Connection Hardware:
  - 1. Fabricate cast-in anchors, inserts, plates, angles, and other anchorage hardware with sufficient anchorage and embedment to comply with delegated engineering.
  - 2. Accurately position for attachment of loose hardware, and secure in place during precasting operations.
  - 3. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.
  - 4. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing architectural precast concrete units to supporting and adjacent construction.
- D. Cast-in reglets, slots, holes, and other accessories in architectural precast concrete.
- E. Cast-in openings larger than 10 in (250 mm) in any dimension. Do not drill or cut openings without Architect's approval.
- F. Reinforcement: Comply with recommendations in PCI MNL 117 for fabricating, placing, and supporting reinforcement:
  - 1. Clean reinforcement of loose rust and mill scale and other materials that reduce or destroy bond with concrete.
  - 2. Accurately position, support, and secure reinforcement against displacement during concrete-placement and consolidation operations. Completely conceal support devices to prevent exposure on finished surfaces.
  - 3. Place reinforcement to maintain at least 3/4 in (19 mm) minimum coverage. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
  - 4. Place reinforcing steel to maintain at least 3/4 in (19 mm) minimum concrete cover. Increase cover requirements for reinforcing steel to 1-1/2 in (38 mm) when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
  - 5. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh spacing and wire tie laps, where required by delegated engineering. Offset laps of adjoining widths to prevent continuous laps in either direction.
- G. Reinforce architectural precast concrete units to resist handling, transportation, and erection stresses.
- H. Placing Concrete:

1. Comply with requirements in PCI MNL 117 and requirements in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.
  2. Place face mixture to a minimum thickness after consolidation of greater of 1 in (25 mm) or 1.5 times maximum aggregate size, but not less than minimum reinforcing cover specified.
  3. Place concrete in a continuous operation to prevent seams or planes of weakness from forming in units.
  4. Place backup concrete mixture to ensure bond with face-mixture concrete.
  5. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air on surfaces. Use equipment and procedures complying with PCI MNL 117.
- I. Hot and Cold Weather Concrete Placement: Comply with PCI MNL or ACI 306.1 procedures for cold weather concrete placement and ACI 305R recommendations for hot weather concrete placement.
  - J. Handling Units: Identify pickup points of architectural precast concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each architectural precast concrete unit on a surface that will not show in finished structure.
  - K. Curing: Cure concrete, according to PCI MNL 117, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture.
  - L. Defective Units: Discard and replace units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 117 and Architect's and Owner's approval.
  - M. Preparation for Shipping: Prior to transporting units to the Project site, apply coating of water repellent to units as recommended by manufacturer/fabricator to protect unit surfaces from staining or moisture damage which may occur during transport. Water repellent shall not permanently change the appearance of the units from the approved field samples.

## **2.13 FABRICATION TOLERANCES**

- A. Fabricate architectural precast concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished unit complies with PCI MNL 117 product tolerances as well as position tolerances for cast-in items.
- B. Brick-Faced Architectural Precast Concrete Units: Restrict the following misalignments to 2 percent of number of bricks in a unit.
  1. Alignment of Mortar Joints:
    - a. Jog in Alignment: 1/8 in (3 mm).
    - b. Alignment with Panel Centerline: Plus or minus 1/8 in (3 mm).
  2. Variation in Width of Exposed Mortar Joints: Plus or minus 1/8 in (3 mm).
  3. Tipping of Individual Bricks from the Panel Plane of Exposed Brick Surface: Plus 1/16 in (1.5 mm); minus 1/4 in (6 mm) less than or equal to depth of form liner joint.
  4. Exposed Brick Surface Parallel to Primary Control Surface of Panel: Plus 1/4 in (6 mm); minus 1/8 in (3 mm).

5. Individual Brick Step in Face from Panel Plane of Exposed Brick Surface: Plus 1/16 in (1.5 mm); minus 1/4 in (6 mm) less than or equal to depth of form liner joint.

C. Stone Veneer-Faced (Smooth Finish) Architectural Precast Concrete Units.

1. Variation in Cross-Sectional Dimensions: For thickness of walls from dimensions indicated: Plus or minus 1/4 in (6 mm).
2. Variation in Joint Width: 1/8 in in 36 in (3 mm in 900 mm) or a quarter of nominal joint width, whichever is less.
3. Variation in Plane between Adjacent Stone Units (Lipping): 1/16 in (1.5 mm) difference between planes of adjacent units.

## **2.14 CONCRETE-FACED UNIT FINISHES**

- A. Unit Finish: Unit faces shall be free of joint marks, grain, and other obvious defects. Corners, chamfers, and including false joints shall be uniform, straight, and sharp.
- B. Exposed Face Surfaces: As scheduled or as indicated in Design Selections; match approved sample units for aesthetic purposes.
- C. Exposed Top, Bottom, and Sides Surfaces: Match exposed face surface finish.
- D. Exposed Back Surfaces: Smooth, steel-trowel finish.
- E. Unexposed Surfaces: Float finish.

## **2.15 SOURCE QUALITY CONTROL**

- A. Quality-Control Testing: Test and inspect units according to PCI MNL 117 requirements.
- B. Owner may employ an independent testing agency to evaluate architectural precast concrete fabricator's quality-control and testing methods.
  1. Allow Owner's testing agency access to material storage areas, concrete production equipment, concrete placement, and curing facilities. Cooperate with Owner's testing agency and provide samples of materials and concrete mixtures as may be requested for additional testing and evaluation.
- C. Strength of precast concrete units will be considered deficient if units fail to comply with ACI 318 (ACI 318M) requirements for concrete strength.
- D. Testing: If there is evidence that strength of precast concrete units may be deficient or may not comply with ACI 318 (ACI 318M) requirements, precaster will employ an independent testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C 42/C 42M.
  1. A minimum of three representative cores will be taken from units of suspect strength, from locations directed by Architect.
  2. Cores will be tested in an air-dry condition.
  3. Strength of concrete for each series of 3 cores will be considered satisfactory if average compressive strength is equal to at least 85 percent of 28-day design compressive strength and no single core is less than 75 percent of 28-day design compressive strength.

4. Test results will be made in writing on same day that tests are performed, with copies to Architect, Contractor, and precast concrete fabricator. Test reports will include the following:
  - a. Project identification name and number.
  - b. Date when tests were performed.
  - c. Name of precast concrete fabricator.
  - d. Name of concrete testing agency.
  - e. Identification letter, name, and type of precast concrete unit(s) represented by core tests; design compressive strength; type of break; compressive strength at breaks, corrected for length-diameter ratio; and direction of applied load to core in relation to horizontal plane of concrete as placed.
- E. Patching: If core test results are satisfactory and precast concrete units comply with requirements, clean and dampen core holes and solidly fill with precast concrete mixture that has no coarse aggregate, and finish to match adjacent precast concrete surfaces.
- F. Defective Work: Units not complying with requirements, including strength, manufacturing tolerances, and finishes, are defective. Replace with units that comply with requirements.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.
- B. Acceptance of Building Structural Frame: Do not install units until supporting cast-in-place concrete building structural framing has attained minimum allowable design compressive strength, supporting structural steel framing, or other structure is complete.

#### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  1. PCI MNL 127.
  2. Respective manufacturer/fabricator's written installation instructions.
  3. Accepted submittals.
  4. Contract Documents.

#### **3.3 PREPARATION**

- A. General: Comply with manufacturer/fabricator's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

### **3.4 INSTALLATION OF ARCHITECTURAL PRECAST CONCRETE**

- A. Erection: Install units level, plumb, in alignment, and square within specified allowable tolerances.
  - 1. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
  - 2. Remove projecting lifting devices and use sand-cement grout to fill voids within recessed lifting devices flush with surface of concrete.
  - 3. Unless otherwise indicated, maintain uniform joint widths of 3/4 in (19 mm).
- B. Attachments, General: Connect units in position by bolting, welding, or grouting.
- C. Bolted Connections: Use lock washers, lock nuts, or other acceptable means to prevent loosening of bolted connections.
- D. Welding: Perform welding in compliance with AWS D1.1/D1.1M and AWS D1.4 with qualified welders.
  - 1. Protect units from damage by field welding or cutting operations, and provide noncombustible shields as required.
  - 2. Repair damaged galvanized steel surfaces by cleaning and applying a coat of galvanizing repair paint to galvanized surfaces.
  - 3. Repair prime painted steel by cleaning and re-priming damaged painted surfaces.
- E. Grouting Connections:
  - 1. Grout connection block-outs after final adjustment.
  - 2. Retain grout in place until hard enough to support itself.
  - 3. Pack spaces with stiff grout material, tamping until voids are completely filled.
  - 4. Place grout to finish smooth, level, and plumb with adjacent concrete surfaces.
  - 5. Keep grouted joints damp for not less than 24 hours after initial set.
  - 6. Promptly remove grout material from exposed surfaces before it affects finishes or hardens.

### **3.5 ERECTION TOLERANCES**

- A. Erect architectural precast concrete units level, plumb, square, true, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 117, Appendix I.
- B. Gutter Drainage System: Securely attach gutter drainage system to back of units using powder actuated fasteners as indicated on the Drawings. Seal joints with silicone joint sealant as specified in Division 07 Section "Joint Sealants". Slope system to positive drain to weeps.

### **3.6 FIELD QUALITY CONTROL**

- A. Testing Agency Field Service: The Owner may employ and pay a qualified independent testing agency to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense.
- B. Field welds will be subject to visual inspections and nondestructive testing according to ASTM E 165 or ASTM E 709. High-strength bolted connections will be subject to inspections.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.

- D. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

### **3.7 REPAIRS**

- A. Procedures:
  - 1. Repair exposed surfaces of units to match color, texture, and uniformity of surrounding precast architectural concrete if permitted by Architect and Owner. Architect and Owner reserves right to reject repaired units that do not comply with requirements.
  - 2. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired Work, when viewed in typical daylight illumination from a distance of 20 ft (6 m).
  - 3. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A 780.
  - 4. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.
  - 5. Remove and replace damaged units if repairs do not comply with requirements.

### **3.8 CLEANING**

- A. Cleaning: After erection and completion of joint treatment, clean exposed surfaces of units to remove weld marks, other markings, dirt, and stains.
  - 1. Perform cleaning procedures, if necessary, according to manufacturer/fabricator's written recommendations.
  - 2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

### **3.9 FINISH SCHEDULE:** Refer to Exterior Elevation drawings.

## **END OF SECTION**

## **SECTION 04 7500**

### **ADHERED MASONRY VENEER**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Adhered masonry veneer and supplementary items necessary for installation.
- B. Plaster System Substrate: As specified in Division 09 Section "Portland Cement Plastering".

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
    - a. Kind, size, and color of masonry unit.
    - b. Manufactured accessory product.
    - c. Setting and grout products.
    - d. Cleaning products, including application procedures.
- B. Shop Drawings: Show details of construction, including dimensioned drawings, plans, elevations, sections, and details of components to be incorporated into Work including, but not limited to, the following:
  - 1. Masonry Veneer Units: Show sizes, profiles, and coursing.
  - 2. Special Masonry Veneer Shapes: Submit large-scale details for each shape required or indicated.
  - 3. Flashing: Large-scale details for each element of flashing system showing layout, profiles, methods of joining, and anchorage details; including lintel units, shelf units, corner units, end dam units, conditions showing interface and relationship to adjacent materials, and other special applications.
  - 4. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
  - 5. Accessories: Show sizes, coursing, and locations.
  - 6. Movement Joints: Show expansion and control joint locations in substrate and veneer.
- C. Samples for Initial Selection: For each type of Masonry Veneer and Colored Mortar indicated. Include samples of accessories involving color selection. Samples shall show full range of colors expected; make samples using same materials to be used on Project; label samples to indicate type and amount of pigments used.
- D. Samples for Verification Purposes: Submit samples for each item listed below of size and construction indicated. Where products involve normal color and texture variations, include sample sets showing the full range of variations expected.
  - 1. Masonry Units: Full-size samples for each different type of veneer unit indicated.

2. Pigmented and Color Aggregate Mortars and Grouts: Make samples using same sand and mortar ingredients to be used on Project. Label Samples to indicate types and amounts of pigments used.
  3. Accessories: Samples of manufactured products, including flashing materials and other accessories.
  4. Flashing: Samples of each shape, profile, intersection and transition required, not less than 12 in (300 mm) long, including end dam and splice/lap joint for flashing; demonstrate soldering quality.
- E. List of Materials Used in Constructing Wall Mock-ups:
1. Product, material, and equipment names, model numbers, lot numbers, batch numbers, source of supply, and other information required to identify items used. Include mix proportions for mortar and source of aggregates.
  2. Receipt of list does not constitute acceptance of deviations from Contract Documents, unless such deviations are specifically accepted by Architect in writing.

### **1.3 INFORMATIONAL SUBMITTALS**

- A. Pre-Construction Test Reports: Written reports from independent testing agency required by "Quality Assurance".
- B. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency, acceptable to authorities having jurisdiction, indicating that product assembly complies with requirements.
- C. Hot and Cold Weather Work Plan: Submit written plan detailing methods, materials and equipment to be used to comply with weather requirements.
- D. Masonry Veneer Cleaning Plan: Based on technical information provided by respective manufacturer for each masonry veneer unit to be cleaned, submit written plan for cleaning exposed masonry veneer surfaces, prepared by commercial cleaning compound manufacturer, with signature of installer indicating acceptance and include following information:
1. Qualifications of applicators.
  2. Products to be used and application procedures.
  3. Masonry veneer surfaces to be cleaned and required preparations.
  4. Environmental requirements by authorities having jurisdiction for use and discharge of cleaning effluents.
  5. Protection of surrounding areas, landscaping, and building surfaces adjacent to area of cleaning.
- E. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".
- F. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required.

G. Qualification Data:

1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.

H. Warranty: Sample of warranty.

1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations, and exclusions.

#### **1.4 CLOSEOUT SUBMITTALS**

- A. Maintenance Instructions: Include in operation and maintenance manual as required by Division 01 Section "Closeout Procedures". Submit manufacturer's instructions for maintenance of installed work, including methods and frequency for maintaining optimum condition under anticipated use. Include precautions against cleaning materials and methods which may be detrimental to finishes and performance.

#### **1.5 QUALITY ASSURANCE**

- A. Quality Standards: In addition to specified requirements, comply with ACI 530.1/ASCE 5/TMS 402 for adhered masonry veneer classification and prescriptive requirements and local building code, whichever is more stringent.
- B. Manufacturer Qualifications: Manufacturer with not less than 10 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- C. Installer Qualifications:
1. Experience: Installer's personnel with not less than 10 years of experience in the successful performance of Work similar to scope of this Project.
  2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 10 years of experience installing products and systems similar to scope of this Project.
  3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.
- D. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1093 to conduct the testing indicated.
- E. Pre-Construction Setting Mortar Testing: Employ and pay an independent testing agency to perform pre-construction testing to establish compliance of proposed Work with requirements.
1. General Requirements: Test mortar for composition to establish code compliance and standard for field testing specified under "Field Quality Control" Article.
  2. Bond Strength Test Method: ANSI 137.1 / ASTM C 482 Test Method for Bond Strength of Ceramic Tile to Portland Cement.
  3. Reports: Interpret test results and prepare certified reports.
  4. Retesting: Retesting of materials failing to meet requirements shall at Contractor's expense.

- F. Sample Panels: Prior to installing masonry, build as many sample panels as required to verify selections made under submittals and to demonstrate aesthetic effects using specified materials:
1. Build approximately 48 in (1200 mm) square for each type of exposed masonry units.
  2. Locate at locations indicated or, if not indicated, as directed by Architect.
  3. Clean exposed faces with masonry cleaner specified.
  4. Where masonry is to match existing masonry, erect panels adjacent and parallel to an existing, south-facing wall where available.
  5. Notify Architect 7 days in advance of the dates and times when panels will be constructed.
  6. Protect accepted sample panels with weather-resistant membrane.
  7. Maintain during construction in an undisturbed condition as a standard for judging completed Work.
  8. Acceptance of panels is for following aesthetic qualities; acceptance does not constitute acceptance of deviations from Contract Documents, unless specifically accepted by Architect in writing:
    - a. Color, texture, and blending of masonry units.
    - b. Color and blending of mortar.
    - c. Relationship of mortar and sealant colors to masonry unit colors.
    - d. Tooling of joints.
    - e. Effectiveness of masonry cleaner.
    - f. Other aesthetic qualities as determined by the Architect.
  9. When directed, demolish and remove sample panels from Project site, including foundations.
- G. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.
1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.
    - a. Show typical components, attachments to building structure, and requirements of installation.
  2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
  3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
  4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
  5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

## **1.6 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

1. Participants:
  - a. Architect.
  - b. Contractor, including superintendent.
  - c. Installer, including project manager and supervisor.
  - d. If requested, Manufacturer's qualified technical representative.
  - e. Installers of other construction interfaced with Work.
2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
  - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
  - b. Review Contract Document requirements.
  - c. Review approved submittals.
  - d. Review inspection and testing requirements.
  - e. Review environmental conditions and procedures for coping with unfavorable conditions.
  - f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
3. Record discussions, including decisions and agreements, and prepare report.

#### **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Delivery: Label pallets of masonry veneer units with manufacturers name, product name, and information required to identify products.
- B. Storage:
  1. Masonry Veneer Units: Store on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
  2. Cementitious Materials: Store on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
  3. Aggregates: Store where grading and other required characteristics can be maintained and contamination avoided.
  4. Accessories: Store to prevent corrosion and accumulation of dirt and oil.

#### **1.8 PROJECT CONDITIONS**

- A. Protection during Work: Prevent excess moisture from entering Work in progress.
  1. Cover tops of walls, projections, and sills with water-repellent tarps or heavy plastic sheets at end of each day's Work.
  2. Cover partially completed masonry veneer when construction is not in progress.
  3. Extend cover minimum of 24 in (600 mm) down both sides and hold cover securely in place.
  4. Protect door and window frames from damage.

- B. Stain Prevention: Prevent mortar and soil from staining exposed masonry veneer. Immediately remove mortar and soil from exposed masonry veneer.
  - 1. Protect base of walls from rain-splashed mud and mortar splatter.
  - 2. Protect sills, ledges, and projections from mortar droppings.
  - 3. Protect surfaces of window and door frames, and other adjacent materials with painted and integral finishes from mortar droppings.
  - 4. Turn scaffolding planks near Work on edge at end of each day to prevent rain from splashing mortar droppings or dirt onto face of exposed masonry.
- C. Cold Weather Requirements: Comply with building code and referenced quality standard whichever is more stringent, and the following:
  - 1. Provide heat and protection (temporary or permanent) as required to protect Work from freezing after application.
  - 2. Distribute heat uniformly to prevent concentration of heat near sources; provide deflection or protective screens.
  - 3. Do not use frozen materials or materials mixed or coated with ice or frost.
  - 4. Do not build on frozen substrates.
  - 5. Remove and replace masonry veneer damaged by frost or freezing conditions.
- D. Warm Weather Requirements: Comply with building code and referenced quality standard whichever is more stringent, and the following:
  - 1. Protect Work against uneven and excessive evaporation and from strong flows of dry air, both natural and artificial.
  - 2. Apply and cure work as required by climatic and job conditions to prevent dryout during cure period.
  - 3. Provide suitable coverings, moist curing, barriers to deflect sunlight and wind, or combinations of these, as required.

## **1.9 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **1.10 WARRANTY**

- A. Installer's Warranty: Furnish installer's written material and labor warranty signed by an authorized representative using installer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material or workmanship defects caused by manufacture or design and installation of product. "Defects" is defined to include but not limited to deterioration or failure to perform as required.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including, but not limited to, loss of adhesion.
    - b. Deterioration of materials beyond normal weathering.
  - 2. Warranty Period: Installer shall warrant the products to be free from material and labor Defects for a period of 5 years from date of Substantial Completion

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
- B. Available Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those listed.
- C. Basis of Design (Product Standard): Contract Documents are based on products specified to establish a standard of quality. Other acceptable manufacturers with products having equivalent characteristics may be considered, provided deviations are minor and do not change intended aesthetic, functional and performance requirements as judged by Architect.
  - 1. Selections: Masonry units to match CNOHC in texture and color.

### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials
- B. Masonry Units: Obtain exposed masonry veneer units of a uniform texture and color, or a uniform blend within ranges accepted for these characteristics.
- C. Cementitious Materials: Obtain cementitious ingredients of a uniform quality, including color, for each component.
- D. Defective Units: Do not install units where defects, including dimensions that vary from specified dimensions by more than stated tolerances, will be exposed in completed Work or will impair quality of completed masonry.
- E. Special Shapes: Provide shapes indicated and as follows for each form of masonry veneer unit required:
  - 1. For applications requiring units of form, color, texture, and size on exposed surfaces that cannot be produced by sawing standard unit sizes.
  - 2. For applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
  - 3. For applications where stretcher units cannot accommodate special conditions including those at L-shape corners, substrate construction and movement joints, bond beams, sashes, and lintels.
  - 4. For units with exposed surfaces such as ends of sills, caps, and similar applications that would otherwise expose unfinished unit surfaces.

### **2.3 PERFORMANCE REQUIREMENTS, GENERAL**

- A. Performance Requirements: Adhesion between masonry veneer unit and backing shall have shear strength of not less than 215 psi (1480 kPa) according to ANSI 137.1 / ASTM C 482.

B. Shape Limitations of Individual Units:

1. Maximum Weight at Exterior Locations: Not to exceed 15 lb/sq ft (73.2 kg/sq m).
2. Maximum Weight at Interior Locations: Not to exceed 20 lb/sq ft (97.6 kg/sq m).
3. Maximum Dimension in Any One Face: Not to exceed 36 in (900 mm).
4. Overall Face Area: Not to exceed 720 sq in (0.464 sq m).
5. Thickness:
  - a. Not less than as indicated.
  - b. Not more than 2-5/8 in (65 mm).

## 2.4 MANUFACTURED STONE MASONRY UNITS

A. Product Quality Standard: Factory manufactured masonry veneer units to resemble natural stone in texture and color; composed of Portland cement, aggregates, mineral oxide pigments, and water; with following physical properties:

1. Special Shapes: Include corners, edge corners, and end edge corners.
2. Back Surface Texture: Scored, combed, wire roughened, ribbed, keybacked, or dovetailed.
3. Unit Compressive Strength: 1800 psi (12.4 MPa) average for 5 cured units according to ASTM C 192 and ASTM C 39; individual units shall not vary by more than 10 percent from average.
4. Freeze-Thaw Resistance: 3.0 percent of original weight according to ASTM C 67.
5. Exposed Faces: Manufacturer's standard.

B. Manufacturers and Products:

1. Coronado Stone Products; Coronado Stone.
2. GAF Materials Corporation; CanyonRock.
3. G.S. Harris Company, Inc.; Harristone Precast Stone Veneer (HPSV).
4. Owens Corning; Cultured Stone.

## 2.5 NATURAL STONE MASONRY UNITS

A. Stone, General: Natural quarried stone, pre-fabricated into modular tiles having uniform and consistent dimensional tolerances; with sawn backs.

1. Back Surface Texture: Scored, combed, wire roughened, ribbed, keybacked, or dovetailed.

B. Material Quality Standard: Limestone, ASTM C 568.

## 2.6 TILE MORTAR SETTING MATERIALS

A. Material Quality Standards: ANSI A118 Series as indicated.

B. Setting Mortar:

1. Material Quality Standard: ANSI A118.4, manufacturer's premium, single component system for mixing at time of installation.
2. Basis of Design:

- a. Laticrete International, Inc.; Laticrete Masonry Veneer Mortar.
  - b. Laticrete International, Inc.; Laticrete 254 Platinum.
- C. Latex-Portland Cement Sanded Grout for Joints Greater than 1/8 in (3 mm) Wide:
  - 1. Material Quality Standard: ANSI A118.7, with following physical properties:
    - a. Manufacturer's premium polymer modified sanded grout product.
    - b. Integral antimicrobial product added during manufacturing to resist mold and mildew growth.
  - 2. Basis of Design:
    - a. Laticrete International, Inc.; PermaColor Grout.

## **2.7 ACCESSORIES FOR CEMENTITIOUS (NON-PLASTER) SUBSTRATES**

- A. Flashing Materials for Cementitious Substrates:
  - 1. Sheet Metal Flashing: Metal flashing, where flashing is exposed or partly exposed and where indicated, complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:
    - a. Material:
      - 1) Material Quality Standard: ASTM A 240 / A 240M or A 666, Type 304.
      - 2) Material Quality Standard: ASTM A 240 / A 240M or A 666, Type 316.
      - 3) Description: Stainless steel, 2D annealed finish, not less than 0.0250 in (24 ga) (0.64 mm) thick, unless noted otherwise.
    - b. Solder:
      - 1) Material Quality Standard: ASTM B 32, Grade Sn60.
      - 2) Description: Solder with acid flux of type recommended by stainless steel sheet manufacturer; use a noncorrosive rosin flux over tinned surfaces.
  - 2. Sealant for Sheet Metal Flashing: Exterior non-sag silicone sealant, Class 150/50, as specified in Division 07 Section "Joint Sealants".
  - 3. High-Temperature Rubberized Asphalt Flashing:
    - a. Description: Minimum 40 mils (1.0 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
    - b. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C).
    - c. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C).
    - d. Available Manufacturers and Products:
      - 1) Carlisle Coatings & Waterproofing; CCW WIP 300HT.
      - 2) Grace Construction Products; Ultra.
      - 3) Henry Company; Blueskin PE200 HT.

- 4) Metal-Fab Manufacturing, LLC; MetShield.
  - 5) Owens Corning; WeatherLock Metal High Temperature Underlayment.
4. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.
- B. Strip Lath Reinforcement for Cementitious Substrates:
1. Product Description: Strips of expanded, self-furred, diamond mesh lath, 3.4 lb/sq yd (1.8 kg/sq m), not less than 6 in (150 mm) wide, with smooth edges.
  2. Material Quality Standard: Hot-dip galvanized steel, ASTM A 653 / A 653M, G60 (Z180) zinc coating.
  3. Available Manufacturers and Products:
    - a. Alabama Metal Industries Corp. (AMICO); Striplath.
    - b. California Expanded Metal Co. (CEMCO); Stripite.
    - c. Clark Western; Striplath.
    - d. Dietrich Metal Framing; Strip Lath (LAST).
- C. Powder Actuated Fasteners for Attaching Strip Lath Reinforcement to Cementitious Substrates:
1. Product Quality Standard: ANSI A10.3.
  2. Product Description: Low velocity, powder actuated fasteners, stainless steel drive pins, length as required for minimum 3/4 in (19 mm) long penetration, with washers sized engage 3 strands of lath; powder loads suitable for application indicated; sufficient to correctly attach or anchor metal lath to substrate indicated without failure.
  3. Available Manufacturers:
    - a. Hilti Corp.
    - b. ITW Ramset/Red Head.
    - c. Powers Fasteners.
    - d. Simpson Strong Tie Anchor Systems.

## 2.8 MASONRY VENEER CLEANERS

- A. Commercial Cleaning Compounds: Products as recommended and approved by masonry veneer and mortar manufacturers.
1. Description: Manufacturer formulated, general purpose cleaner for removing mortar stains, efflorescence, and other construction related stains from new masonry veneer surfaces, with following suitability requirements:
    - a. Suitable for masonry veneer units and mortar installed, without discoloring or damaging masonry veneer materials.
    - b. Suitable for conditions at project site, including, but not limited to, windows, doors, other exterior wall elements, and adjacent walks or landscaping.
  2. Manufacturers:
    - a. Diedrich Technologies, Inc.
    - b. EaCoChem.

c. Prosoco, Inc.

B. Cleaning Restrictions: Following methods are not permitted nor will they be allowed:

1. Hydrochloric acid.
2. Muratic acid.
3. Pressurized water blasting.
4. Abrasive blasting.

## **2.9 METAL FLASHING FABRICATION**

A. Field Measurements: Where metal flashing is to fit, cope, or be tailored to other construction, check actual dimensions of other construction by accurate field measurements before fabrication of metal flashing.

B. Fabrication Procedures: Fabricate continuous flashings in sections 8 ft (2.4 m) long minimum, but not exceeding 12 ft (3.6 m). Provide splice plates at joints of formed, smooth metal flashing.

1. Shop form flashing on a bending brake.
2. Shape, trim and hand seam on bench as far as practical with proper tools.
3. Form exposed metal Work without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated.
4. Make angle bends and folds for interlocking metal with full regard for expansion and contraction to avoid buckling or fullness in metal after installation.
5. Form materials to shape indicated with straight lines, sharp angles and smooth curves.
6. Fold and hem exposed edges of flashings.

C. Flashing Joinery: Fabricate interior and exterior corners, intersections, and complex flashing conditions in shop, rather than in field, with properly folded, constructed and continuous soldered joints. Field fabricated units are not permitted and will not be allowed.

## **2.10 SETTING MORTAR AND GROUT MIX**

A. General Procedures:

1. Mix to comply with referenced quality standards and manufacturers' written instructions.
2. Add materials, water, and additives in accurate proportions.
3. Use type of mixing equipment, speeds, containers, time, and other procedures to produce uniform quality with optimum performance characteristics for installations indicated.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to most restrictive of the following standards:
  - 1. ACI 530.1/ASCE 5/TMS 402 and local building code.
  - 2. Respective manufacturer's written installation instructions.
  - 3. Accepted submittals.
  - 4. Contract Documents.
  - 5. ANSI A108.5.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
  - 1. Verify that concrete substrates are dry and free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with adhered masonry veneer.
    - a. If necessary, shot-blast concrete substrate with an apparatus recommended by setting materials manufacturer.
    - b. Repair damaged and deteriorated concrete.
    - c. Use patching and fill material to fill holes and depressions in substrates.

### **3.4 APPLICATION OF PLASTER SYSTEM SUBSTRATE**

- A. Scratch and Brown Coat Plaster System over Metal Lath: As specified in Division 09 Section "Portland Cement Plastering".

### **3.5 INSTALLATION OF ADHERED MASONRY VENEER UNITS**

- A. Openings: Leave for equipment to be installed before completion of masonry veneer; after installation of equipment, complete masonry veneer to match construction immediately adjacent to opening.
- B. Cutting: Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, un-chipped edges. Install cut units with cut surfaces and, where possible, cut edges concealed.
- C. Layout: Lay out walls in advance for accurate spacing of surface bond patterns, uniform joint thicknesses, accurate location of openings, movement-type joints, returns, and offsets. Avoid using of less than half-size units at corners, jambs, and where possible at other locations.
  - 1. Masonry veneer shall not be placed over building expansion or control joints. Provide movement joints and continue construction, control, and expansion joints in building structure or substrate construction through masonry veneer work and as indicated on Drawings.

2. Provide movement joints where masonry veneer work abuts a restraining structure or dissimilar assembly.
  3. When metal trim or sealant/backer is used for joint, width shall not be less than width of joint in building structure.
- D. Blending of Masonry Veneer Units: Mix units for exposed unit masonry from several pallets or cubes as they are placed to produce uniform blend of colors and textures. If color blending is a critical aspect of Work, manufacturer shall provide instructions for blending.
- E. Mortar Workability: Mortar with added color pigments shall not be retempered. Discard mortar that has begun to stiffen or is not used within 2.5 hours after initial mixing.
- F. Work Pattern: Begin Work at bottom of wall and proceed up, or begin and proceed down wall, according to manufacturer's instructions.
- G. Built-In Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry veneer around built-in items.
- H. Adhering Method over Framed Construction with Plaster System Substrate: Adhere masonry veneer units to cured Plaster System Brown Coat using mortar according to manufacturer's instructions:
1. Mortar Setting Bed:
    - a. Completely coat back of masonry units and face of plaster with setting mortar bond coat, then apply setting mortar to both surfaces.
      - 1) Key a thin coat of setting mortar into back of masonry and substrate with straight trowel, then comb setting mortar with notched trowel onto back of masonry and substrate.
    - b. Apply 3/8 to 1/2 in (10 to 12 mm) thick layer of setting mortar. Use sufficient setting mortar so a slight excess will be forced out the edges of masonry units as they are set. Tap units into place, completely filling space between units and plaster to provide 100 percent coverage according to manufacturer's instructions.
    - c. Remove excess mortar; do not allow mortar to dry on face of units.
- I. Adhering Method over Concrete Construction: Adhere masonry veneer units to cured concrete substrates using mortar according to manufacturer's instructions:
1. Mortar Setting Bed:
    - a. Completely coat back of masonry units and face of concrete with setting mortar bond coat, then apply setting mortar to both surfaces.
      - 1) Key a thin coat of setting mortar into back of masonry and substrate with straight trowel, then comb setting mortar with notched trowel onto back of masonry and substrate.

- b. Apply 3/8 to 1/2 in (10 to 12 mm) thick layer of setting mortar. Use sufficient setting mortar so a slight excess will be forced out the edges of masonry units as they are set. Tap units into place, completely filling space between units and plaster to provide 100 percent coverage according to manufacturer's instructions.
  - c. Remove excess mortar; do not allow mortar to dry on face of units.
- J. Adhering Method over Interior Masonry Construction: Adhere masonry veneer units to interior masonry construction using mortar according to manufacturer's instructions:
  - 1. Mortar Setting Bed:
    - a. Completely coat back of masonry units and face of plaster with setting mortar bond coat, then apply setting mortar to both surfaces.
      - 1) Key a thin coat of setting mortar into back of masonry and substrate with straight trowel, then comb setting mortar with notched trowel onto back of masonry and substrate.
    - b. Apply 3/8 to 1/2 in (10 to 12 mm) thick layer of setting mortar. Use sufficient setting mortar so a slight excess will be forced out the edges of masonry units as they are set. Tap units into place, completely filling space between units and plaster to provide 100 percent coverage according to manufacturer's instructions.
    - c. Remove excess mortar; do not allow mortar to dry on face of units.
- K. Adhering Method over Exterior Masonry Construction with Plaster System Substrate: Adhere masonry veneer units to cured Plaster System Brown Coat using mortar according to manufacturer's instructions:
  - 1. Mortar Setting Bed:
    - a. Completely coat back of masonry units and face of plaster with setting mortar bond coat, then apply setting mortar to both surfaces.
      - 1) Key a thin coat of setting mortar into back of masonry and substrate with straight trowel, then comb setting mortar with notched trowel onto back of masonry and substrate.
    - b. Apply 3/8 to 1/2 in (10 to 12 mm) thick layer of setting mortar. Use sufficient setting mortar so a slight excess will be forced out the edges of masonry units as they are set. Tap units into place, completely filling space between units and plaster to provide 100 percent coverage according to manufacturer's instructions.
    - c. Remove excess mortar; do not allow mortar to dry on face of units.
- L. Joints:
  - 1. Using a grout bag, fill joints with setting mortar.
  - 2. Finish joints that will remain exposed with a tool slightly larger than joint width to form a concave profile. Tool joints after mortar has taken its initial set and in such a manner as to squeeze mortar back into joint.

### **3.6 EMBEDDED FLASHINGS**

- A. General: Drawings may not necessarily indicate or describe full extent of Work required for completion of embedded flashing.
- B. Reglets and Nailers: Install for flashing and other related construction where they are shown.
- C. Scheduled Locations: In addition to conditions shown on Drawings, install embedded flashings at following locations to direct infiltrated water to exterior:
  - 1. Heads, jambs and sills at through-wall openings.
  - 2. Other obstructions.
- D. Preparation: Substrate surfaces shall be smooth and free from projections that could puncture flashing.
- E. Flashing Installation:
  - 1. Install true to line and levels indicated; minimize quantity of lap joints by using longest units possible.
  - 2. Set in proper locations with outside hemmed edges flush with building face location indicated; securely attach to substrate with same fasteners as used for attaching metal lath.
  - 3. Terminate ends of horizontal flashings with properly folded and constructed end dams with a depth of not less than indicated, with continuous soldered joints.
  - 4. At lap joints of horizontal flashings, form neat and aligned joints by interlocking splice plate within hemmed edge of sheet metal flashing profile; apply sealant and rubberized asphalt flashing as indicated to create water-resistant joint.
- F. Examination and Repair: Immediately prior to installing masonry veneer, examine exposed surfaces of flashing and seal penetrations and damaged areas with rubberized asphalt flashing material before covering with masonry veneer.

### **3.7 MASONRY VENEER EXPANSION JOINTS**

- A. General: Install masonry veneer expansion joints materials as Work progresses. Do not allow materials to span masonry veneer expansion joints without provision to allow for in-plane wall or partition movement. Maintain joints free and clear of mortar.
  - 1. Movement joints including expansion, deflection and control joints shall align through substrate and masonry veneer.
- B. Distance between Control Joints: 1/2 in (12 mm) wide joints not more than 12 ft (3.6 m) on center each direction and a length-to-width ratio of 2-1/2 to 1.
  - 1. Vertical Surfaces: Not more than 144 sq. ft. (13.4 sq. m).
  - 2. Horizontal Surfaces: Not more than 100 sq. ft. (9.3 sq. m).
- C. Form open joint of width indicated for installation of sealant and backer rod specified in Division 07 Section "Joint Sealants".
- D. Build in horizontal pressure-relieving joints where indicated; construct of width required.

### 3.8 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.
  - 1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.
- B. Manufacturer's Field Service - Masonry Veneer Cleaning Product: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.
  - 1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.
- C. Testing Agency Field Service: Employ and pay a qualified independent testing agency to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense.
  - 1. Testing: Testing agency will test and evaluate Work during construction as necessary but not less than at following times during Work.
    - a. First day.
    - b. 5 percent.
    - c. 15 percent.
    - d. 30 percent.
    - e. 60 percent.
    - f. 90 percent.
  - 2. Bond Strength Test Method: ANSI 137.1 / ASTM C 482 Test Method for Bond Strength of Ceramic Tile to Portland Cement.
  - 3. Inspections: Testing agency will visit project site periodically at random, but not less than once during each week of masonry veneer Work, to inspect progress and to ascertain if Work complies with Contract Documents. Allow inspectors access to scaffolding and Work areas, as needed to perform inspections. Inspections will include verification that:
    - a. Materials are properly stored.
    - b. Installation is within specified construction tolerances.
    - c. Proper mortar ingredients and mixing techniques are being used.
    - d. Mortar time on board is within specified limits.
    - e. Setting mortar bed is within specified limits.
    - f. Joints are being properly tooled.
    - g. Flashing assembly is being properly fabricated and installed.
    - h. Masonry veneer expansion joints are being installed as indicated or as specified.

### **3.9 ADJUSTING**

- A. Repairs for Damage: Remove and replace masonry veneer units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units and install fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During tooling of joints, enlarge any voids or holes, except weeps and vents, and completely fill with mortar. Point up all joints including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for application of sealants, where indicated.

### **3.10 CLEANING**

- A. In-Progress Cleaning: As soon as practical, clean masonry veneer as Work progresses by dry brushing to remove mortar fins and smears prior to tooling joints.
- B. Protection: Prior to Final Cleaning, protect surrounding areas, landscaping, adjacent surfaces, and vehicles from contact with cleaning products.
- C. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry veneer as follows:
  - 1. Protect adjacent and nearby materials, especially windows and glass, to avoid damage.
  - 2. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  - 3. Test cleaning methods on mock-ups; leave one half of panel uncleaned for comparison purposes. Obtain Architect's acceptance of sample cleaning before proceeding with cleaning of permanent masonry veneer.
  - 4. Clean masonry veneer by means recommended by cleaning product manufacturer using masonry cleaner compound as recommended and approved by masonry veneer and mortar manufacturers.
  - 5. Avoid drifting of cleaning spray caused by wind.

### **3.11 ADHERED MASONRY SCHEDULE**

- A. Basis of Design: Masonry Units to match CNOHC in texture and color.

**END OF SECTION**

17-13 OSU, College of Osteopathic Medicine at  
Cherokee Nation  
Childers Architect  
2019-07-26

ADHERED MASONRY VENEER

047500 - 18

## **SECTION 054000**

### **COLD-FORMED METAL FRAMING**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Cold-formed metal framing assemblies and supplementary items necessary for installation.
  - 1. Exterior non-load-bearing curtain wall framing.
  - 2. Soffit framing.
  - 3. Axial load-bearing wall framing.
  - 4. Floor joist framing.
  - 5. Roof rafter framing.
  - 6. Ceiling joist framing.
  - 7. Cold-formed steel trusses for roofs.
  - 8. Cold-formed steel trusses for floors.

##### **1.2 DELEGATED ENGINEERING REQUIREMENTS**

- A. Contract Documents Design Intent: Drawings and Specifications indicate design intent for products and systems and do not necessarily indicate or specify total Work required. Contract Documents shall not be construed as an engineered design; furnish and install all Work required for a complete installation.
- B. Delegated Engineering Responsibility: Contractor shall employ a qualified professional engineer to provide engineering for products and systems including attachment to building structure required to meet design intent of Contract Documents.
  - 1. Preparation of structural analysis data including engineering calculations, shop drawings and other submittals signed and sealed by the qualified professional engineer.
- C. Delegated Engineering Professional Qualifications: Professional engineer legally authorized to practice in jurisdiction where Project is located and experienced in providing engineering services of kind indicated for products and systems similar to this Project and has a record of successful in-service performance.
- D. Coordination of Work:
  - 1. Product Variations: In the event of minor differences between products and systems of acceptable or available manufacturers, Contractor shall notify Architect of such differences and resolve conflicts in a timely manner. Failure of Contractor to provide notification shall be construed as acceptance of conditions indicated, and changes caused by minor differences between products and Contract Documents shall be included in the Work at no additional cost to Owner.

2. Allowable Adjustments: Minor dimension and profile adjustments may be made in interest of fabrication or erection methods or techniques or ability to satisfy design intent, provided design intent is maintained as determined by Architect. Proposed deviations shall include a detailed analysis of impact to adjacent substrates or other building systems, including related design or construction cost impacts. If accepted by Architect, deviations causing changes in materials, constructability, substrates, or conditions shall be included in the Work at no additional cost to Owner.

### **1.3 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  1. Include manufacturer's specifications for materials, finishes, construction details, and installation instructions.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.
  1. Include layout, spacing, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
  2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

### **1.4 INFORMATIONAL SUBMITTALS**

- A. Welding Certificates: Written certifications for welding procedures and personnel.
- B. Delegated Engineering Calculations: Informational submittal for products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation; test reports are not acceptable substitute for calculations.
  1. Indicate loads and reactions at interface with primary structural framing and foundations.
- C. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
  1. Steel sheet.
    - a. Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
  2. Expansion anchors. ICC ESR or other product approval acceptable to Engineer.
  3. Power-actuated anchors. ICC ESR or other product approval acceptable to Engineer.
  4. Mechanical fasteners. ICC ESR or other product approval acceptable to Engineer.
  5. Vertical deflection clips.
  6. Horizontal drift deflection clips.
  7. Miscellaneous structural clips and accessories.

- D. Research/Evaluation Reports for Fire Rated Assemblies: Evidence of cold-formed metal framing's compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
- E. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".
- F. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.

## **1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Installer Qualifications:
  - 1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  - 2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
- C. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- D. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
  - 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."
- E. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.
  - 1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.
    - a. Show typical components, attachments to building structure, and requirements of installation.
  - 2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
  - 3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
  - 4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.

5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

## **1.6 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.
  1. Participants:
    - a. Architect.
    - b. Contractor, including superintendent.
    - c. Installer, including project manager and supervisor.
    - d. If requested, Manufacturer's qualified technical representative.
    - e. Installers of other construction interfaced with Work.
  2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
    - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
    - b. Review Contract Document requirements.
    - c. Review approved submittals.
    - d. Review inspection and testing requirements.
    - e. Review environmental conditions and procedures for coping with unfavorable conditions.
    - f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
  3. Record discussions, including decisions and agreements, and prepare report.

## **1.7 PROJECT CONDITIONS**

- A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

## **1.8 DELIVERY, STORAGE, AND HANDLING**

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

## **1.9 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
1. CEMCO.
  2. ClarkDietrich Building Systems.
  3. Consolidated Fabricators Corp.
  4. Marino\WARE.
  5. MBA Metal Framing.
  6. United Metal Products, Inc.

### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

### **2.3 PERFORMANCE REQUIREMENTS**

- A. General Performance: Engineer products and systems to withstand loads within limits of stresses for the materials involved under conditions indicated and without permanent deformation or failure of materials.
- B. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.
- C. Cold-Formed Steel Framing Design Standards:
1. Wall Studs: AISI S211.
  2. Headers: AISI S212.
  3. Lateral Design: AISI S213.
- D. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
- E. Design Loads: Engineer to withstand design loads including but not limited to gravity, wind, seismic, and erection design loads and thermal movements established by authorities having jurisdiction, applicable local building codes, and as indicated on the Structural Drawings.
1. Structural Movement: Engineer to withstand movements of structure including, but not limited to, drift, twist, column shortening, long-term creep and deflection from uniformly distributed and concentrated live loads. Contractor shall obtain required design data and identify movements accommodated on submittal drawings.

- a. System shall accommodate plus or minus 3/8 in (10 mm) differential vertical deflection of floors.
- b. Maintain exterior wall design and incorporate an expansion and contraction joint located above ceiling line to isolate movement between interior and exterior finishes.
- c. Stud depth and spacing indicated is critical for performance of other materials and shall not be changed without consideration of other materials.
- d. Wind Loads: As indicated in applicable building codes, and as indicated on the Structural Drawings.

1) As indicated in Wind and/or Cladding Report.

- F. Definition of Design loads for Deflection Calculations: Nominal loads combined using allowable stress load combinations and code required wind loads based on a 50 year return interval wind speed. Reductions for a lower wind speed return interval are not allowed.
- G. Deflection of Framing Members: Engineer framing systems to withstand design loads without deflections greater than following, without contribution from sheathing materials:
  - a. Exterior Wall Framing for Adhered Masonry Veneer: Horizontal deflection of 1/720 of the wall span.
  - b. Ceiling Joist Framing (Interior Roof): Vertical deflection of 1/360 of the span for live loads and 1/240 for total loads of the span.
- 2. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F (49 deg C).
- H. Building Maintenance Equipment: Engineer units supporting building maintenance equipment to resist pull-out and horizontal shear forces transmitted from equipment.
- I. Dimensional Tolerances: Engineer products and systems to accommodate dimensional tolerances of framing members and adjacent construction.

## **2.4 COLD-FORMED STEEL FRAMING, GENERAL**

- A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
  - 1. Grade: ST33H (ST230H) minimum, as required by structural performance.
    - a. ST33H (ST230H) for minimum uncoated steel thickness of 0.0428 in (1 mm) and less.
    - b. ST50H (ST340H) for minimum uncoated steel thickness of 0.0538 in (1.3 mm) and greater.
  - 2. Coating: G60 (Z180) for interior locations; G90 (Z275) for exterior envelope.
- B. Steel Sheet for Vertical Deflection or Drift Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: 33 (230) minimum, as required by structural performance.
2. Coating: G60 (Z180) for interior locations; G90 (Z275) for exterior envelope.

## **2.5 FRAMING**

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
  1. Minimum Base-Metal Thickness: 0.0428 in (1 mm).
  2. Flange Width: 1-5/8 in (40 mm), minimum.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
  1. Minimum Base-Metal Thickness: 0.0428 in (1 mm).
  2. Flange Width: 1-1/4 in (32 mm), minimum.
- C. Vertical Deflection and Drift Clips: Manufacturer's standard bypass or head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web and structure.
- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
  1. Minimum Base-Metal Thickness: 0.0538 in (1.3 mm).
  2. Flange Width: Manufacturers standard deep flange, minimum 3 in (75 mm), at head of exterior walls where studs occur between structural floors, standard flange elsewhere.

## **2.6 SOFFIT FRAMING**

- A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
  1. Minimum Base-Metal Thickness: 0.0428 in (1 mm).
  2. Flange Width: 1-5/8 in (40 mm), minimum.

## **2.7 FRAMING ACCESSORIES**

- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
  1. Supplementary framing.
  2. Bracing, bridging, and solid blocking.
  3. Web stiffeners.
  4. Anchor clips.
  5. End clips.

6. Foundation clips.
7. Gusset plates.
8. Stud kickers and knee braces.
9. Joist hangers and end closures.
10. Hole reinforcing plates.
11. Backer plates.

C. Metal Deck: 9/16 in (14 mm), corrugated, ASTM A 653 / A 653M, G90 (Z275) hot-dip galvanized coating.

1. Design Uncoated-Steel Thickness: 0.02956 in (22 gage) (0.72 mm) minimum.

## **2.8 ANCHORS, CLIPS, AND FASTENERS**

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318, as determined by testing per ASTM E 488 conducted by a qualified testing agency.

D. Powder-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.

1. Manufacturers:

- a. Hilti Corp.
- b. ITW Ramset/Red Head.
- c. Powers Fasteners.
- d. Simpson Strong Tie Anchor Systems.

2. For post-tensioned concrete, anchors shall not exceed 1 in (25 mm) embedment. Obtain Structural Engineer's written approval for all proposed anchors in post-tensioned concrete prior to installation.

E. Hold Down Clips: Wall anchoring system of type suitable for application indicated, hot dip galvanized unless indicated otherwise.

1. Basis of Design: Simpson Strong-Tie; Hold Down HD Series.

F. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

G. Welding Electrodes: Comply with AWS standards.

## **2.9 MISCELLANEOUS MATERIALS**

- A. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B.
- B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107/C 1107M, with fluid consistency and 30-minute working time.
- D. Shims: Load bearing, high-density multimonomer plastic, and nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.
- E. Thermal Insulation: For boxed-in sections, ASTM C 665, Type I, unfaced mineral-fiber blankets produced by combining glass or slag fibers with thermosetting resins.

## **2.10 FABRICATION**

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

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. AISI's "Standard for Cold-Formed Steel Framing - General Provisions".
  - 2. Respective manufacturer's written installation instructions.
  - 3. Accepted submittals.
  - 4. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
- B. Coordination with Sprayed Fire-Resistive Materials:
  - 1. Before Application: Attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
  - 2. After Application: Remove only as needed to complete installation of cold-formed steel stud framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.
- C. Install load bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 in (6 mm) to ensure a uniform bearing surface on supporting concrete or masonry construction.

### **3.4 INSTALLATION, GENERAL**

- A. Installation Options: Cold-formed steel stud framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install, bridge, and brace cold-formed steel trusses according to AISI S200, AISI S214, AISI's "Code of Standard Practice for Cold-Formed Steel Structural Framing," and manufacturer's written instructions unless more stringent requirements are indicated.

- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
  - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 in (1.5 mm).
- D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
  - 1. Cut framing members by sawing or shearing; do not torch cut.
  - 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
    - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- H. Install insulation, specified in Section 072100 "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.
- J. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 in in 10 ft (1:960) and as follows:
  - 1. Space individual framing members no more than plus or minus 1/8 in (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

### **3.5 EXTERIOR NON-LOAD-BEARING CURTAIN WALL INSTALLATION**

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Fasten both flanges of studs to bottom track, and top track if slotted, unless otherwise indicated. Space studs as follows:

1. Stud Spacing: 16 in (400 mm).
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
  1. Infill wall framing with deflection track: Install single deep-leg deflection tracks and anchor to building structure.
  2. Curtain wall or panelized framing with deflection clips: Connect vertical deflection clips to bypassing studs and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 in (1200 mm) apart. Fasten at each stud intersection. One of the following:
  1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 18 in (450 mm) of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
  2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

### **3.6 FIELD QUALITY CONTROL**

- A. Testing Agency: Engage a qualified independent testing agency to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor<sup>TMTMs</sup> expense.
- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Remove and replace work where test results indicate that it does not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

### **3.7 REPAIRS AND PROTECTION**

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

**END OF SECTION**

**17-13 OSU, College of Osteopathic Medicine at  
Cherokee Nation  
Childers Architect  
2019-07-26**

**COLD-FORMED  
METAL  
FRAMING**

**05 4000 - 14**

## **SECTION 05 4300**

### **SLOTTED CHANNEL FRAMING**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Slotted channel framing and accessories necessary to complete installation.

##### **1.2 DELEGATED ENGINEERING REQUIREMENTS**

- A. Contract Documents Design Intent: Drawings and Specifications indicate design intent for products and systems and do not necessarily indicate or specify total Work required. Contract Documents shall not be construed as an engineered design; furnish and install all Work required for a complete installation.
- B. Delegated Engineering Responsibility: Contractor shall employ a qualified professional engineer to provide engineering for products and systems including attachment to building structure required to meet design intent of Contract Documents.
  - 1. Preparation of structural analysis data including engineering calculations, shop drawings and other submittals signed and sealed by the qualified professional engineer.
- C. Delegated Engineering Professional Qualifications: Professional engineer legally authorized to practice in jurisdiction where Project is located and experienced in providing engineering services of kind indicated for products and systems similar to this Project and has a record of successful in-service performance.
- D. Coordination of Work:
  - 1. Product Variations: In the event of minor differences between products and systems of acceptable or available manufacturers, Contractor shall notify Architect of such differences and resolve conflicts in a timely manner. Failure of Contractor to provide notification shall be construed as acceptance of conditions indicated, and changes caused by minor differences between products and Contract Documents shall be included in the Work at no additional cost to Owner.
  - 2. Allowable Adjustments: Minor dimension and profile adjustments may be made in interest of fabrication or erection methods or techniques or ability to satisfy design intent, provided design intent is maintained as determined by Architect. Proposed deviations shall include a detailed analysis of impact to adjacent substrates or other building systems, including related design or construction cost impacts. If accepted by Architect, deviations causing changes in materials, constructability, substrates, or conditions shall be included in the Work at no additional cost to Owner.

##### **1.3 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.

- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work. Include the following:
  - 1. Strapping, bracing, bridging, splices, and connection details.
  - 2. Materials, sizes, spacings, and thicknesses.
  - 3. Specifics for equipment being supported by framing.
  - 4. Adjacent building structure, mechanical and electrical elements.
  - 5. Details for anchoring and attachment to building structure.

#### **1.4 INFORMATIONAL SUBMITTALS**

- A. Delegated Engineering Calculations: Informational submittal for products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation; test reports are not acceptable substitute for calculations.
- B. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.

#### **1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 10 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Installer Qualifications:
  - 1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  - 2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
  - 3. Manufacturer/Fabricator Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer/fabricator to install products.

#### **1.6 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

#### **1.7 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
1. Horizontal Spanning Members; Upper, Lower and Main Subrails:
    - a. Cooper B-Line, Inc.; MQ-124X channels
    - b. Hilti; B12A channels
    - c. Unistrut Corp.; P5501 channels
  2. Vertical Columns:
    - a. Cooper B-Line, Inc.; MQ-41 channels
    - b. Hilti; BTS 22TH struts
    - c. Unistrut Corp.; P9200 tubes
  3. Diagonal and Horizontal Bracing:
    - a. Cooper B-Line, Inc.; MQ-41 channels
    - b. Hilti; BTS 22 channels
    - c. Unistrut Corp.; P1000 channels
  4. Inside Vertical Columns:
    - a. Cooper B-Line, Inc.; MQ-41 channels
    - b. Hilti; BTS 22TH struts
    - c. Unistrut Corp.; P1000 H3 channels

### **2.2 SYSTEM DESCRIPTION**

- A. Equipment Support: Framing consisting of necessary slotted channel framing members such as beams, columns, braces, fittings, spanning members, longitudinal rails, track supports, and components such as channel connectors, nuts, bolts, washers, shim plates, and general hardware, for a complete and properly functioning support structure for equipment.

### **2.3 PERFORMANCE REQUIREMENTS**

- A. Structural Requirements: Engineer slotted channel framing according to delegated engineering quality standards to withstand live and dead loads according to authorities having jurisdiction, applicable local building codes, and information indicated within limits and under conditions indicated, without material failure or permanent deformation of structural members.
1. Structural Movement: Engineer to withstand movements of structure including, but not limited to, drift, twist, column shortening, long-term creep; accommodate 3/8 in (9.5 mm) differential vertical deflection of floors
  2. Design Loads: As required by scheduled equipment.

3. Deflection:  $L/720$  of span in either plane (vertical or horizontal) when maximum loading conditions is applied on either rail, due to equipment operation, including positioning of equipment at extremities of its travel.
4. Seismic Loads: Engineer to withstand effects of earthquake motions.
5. Design Criteria:
  - a. Equipment Information: Coordinate engineering with information provided by manufacturer of equipment being supported.
  - b. Minimum Factor of Safety: 2 based on ultimate strength under static loading conditions.
- B. Delegated Engineering Quality Standards: Determine allowable working stresses of materials according to authorities having jurisdiction, applicable local building codes, framing manufacturers design data, MFMA-4, and MFMA-103.

## **2.4 FRAMING MATERIALS AND COMPONENTS**

- A. Slotted Channels:
  1. Product Quality Standard: MFMA-4.
  2. Interior Locations: C-shape channels fabricated from ASTM A 1011 Grade 33 cold-rolled steel sheet or ASTM A 1008 Grade 33 for hot-rolled steel sheet, structural classification; with continuous open slot formed by inturred serrated or unserrated lips, and intermediate slots in back of channel; riveted back-to-back type for primary horizontal framing members; wall thickness as required by engineering design.
    - a. Painted Factory Finish: Chemically cleaned, phosphated, electro deposited acrylic or electrostatically-applied polyester finished, then baked; resisting minimum 300 hours of salt spray exposure according to ASTM B 117.
  3. Profile Size: 1-5/8 in (40 mm) wide by depth required by delegated engineering.
- B. Channel Connectors: Standard 2 part connectors of type, size and material required by delegated engineering; fabricated from carbon steel with nuts and threaded bolts; with or without springs; electro-galvanized finish; from same manufacturer as slotted channels.
- C. General Hardware: Standard fittings, bases, brackets, and clamps of three-dimensional shape suitable for condition and type, size and material required by delegated engineering; fabricated from carbon steel; same finish as slotted channels; from same manufacturer as slotted channels.
- D. Fasteners to Building Structure: Welding rods and expansion anchors as specified in Division 5 Section "Metal Fabrications."
- E. PVC Closure Strip: Paintable PVC closure strip; Unistrut Corp; P1184P, grey color.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. MFMA-103.
  - 2. Respective manufacturer/fabricator's written installation instructions.
  - 3. Accepted submittals.
  - 4. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

### **3.4 INSTALLATION**

- A. Erection:
  - 1. Install slotted channel framing members and components square, true to line, level and plumb; and securely in place to properly support schedule equipment.
  - 2. Cut slotted channels with powered cutting saws; flame-cutting is not permitted.
  - 3. Tighten all connections to torque required by engineering design
- B. Tolerances:
  - 1. Horizontal Mounting Surfaces: Align within 1/32 in (0.8 mm) in 24 in (600 mm) and within 1/16 in (1.5 mm) in 18 ft (5.4 m).
  - 2. Elevation Between Rails: Difference between 2 rails within 1/16 in (1.5 mm) in 24 in (600 mm).
- C. PVC Closure Strips: Install at all exposed rails.

**END OF SECTION**

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Cherokee Nation  
Childers Architect  
2019-07-26**

**SLOTTED CHANNEL FRAMING**

**05 4300 - 6**

**SECTION 05 5000**  
**METAL FABRICATIONS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes: Metal fabrications and supplementary items necessary for installation.

**1.2 DEFINITIONS**

- A. Unprotected Areas: Exterior areas directly that are exposed to the elements such as rain, snow, or ice.
- B. Protected Areas: Interior and exterior areas that are not directly exposed to the elements such as rain, snow, or ice.

**1.3 ACTION SUBMITTALS**

- A. Product Data: Manufacturer/fabricator's technical literature for each product and system indicated.
  - 1. Include manufacturer/fabricator's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.

**1.4 INFORMATIONAL SUBMITTALS**

- A. Welding Certifications: Certificates for welding procedures and personnel.
- B. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
- C. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".
- D. Manufacturer/Fabricator's Project Acceptance Document: Certification that products are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required.
- E. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.

## **1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Installer Qualifications:
  - 1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  - 2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
- C. Welding Qualifications: Qualify procedures and personnel according to following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel".
  - 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel".

## **1.6 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

## **1.7 PROJECT CONDITIONS**

- A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

## **1.8 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.
- B. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
- B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other available manufacturers/fabricators offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

## **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer/fabricator. Provide secondary materials only as recommended by manufacturer/fabricator of primary materials.

## **2.3 FERROUS METAL MATERIALS**

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, blemishes, or other imperfections where exposed to view on finished units. Do not use steel sheet with variations in flatness exceeding those permitted by referenced standards for stretcher-leveled sheet.
- B. Steel:
  - 1. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
  - 2. Steel Tubing: ASTM A 500, cold-formed steel tubing.
  - 3. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless another weight is indicated or required by structural loads.
  - 4. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
  - 5. Finish:
    - a. Unprotected Areas: Galvanized metal.
    - b. Protected Areas: Uncoated ferrous metal.

## **2.4 NON-FERROUS METAL MATERIALS**

- A. Aluminum Plate and Sheet: ASTM B 209/B 209M, Alloy 6061-T6.
- B. Aluminum Extrusions: ASTM B 221/B 221M, Alloy 6063-T6.
- C. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
- D. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

## **2.5 FASTENERS**

- A. Fastener Type and Material: Select fasteners for type, grade, and class required to produce connections suitable for anchoring fabrications to other types of construction indicated.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307/F 568M, Grade A/ ASTM F 568M, Property Class 4.6; with hex nuts, ASTM A 563/A 563M; and, where indicated, flat washers.
- C. Stainless Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593/F 738M; with hex nuts, ASTM F 594/F 836M; and, where indicated, flat washers; and as follows:
  - 1. Protected Areas:
    - a. Alloy Group 1 (A1) for Type 304.

2. Unprotected Areas:

- a. Alloy Group 1 (A1) for Type 304.
  - b. ~~Alloy Group 2 (A4) for Type 316.~~
- D. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563/ A 563M; and, where indicated, flat washers. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- E. Plain Washers: Round carbon steel, ASME B18.22.1/ASME B18.22M.
- F. Lock Washers: Helical, spring type carbon steel, ASME B18.21.1/ASME B18.21.2M.
- G. Eyebolts: ASTM A 489.
- H. Machine Screws: ASME B18.6.3/B18.6.7M.
- I. Lag Screws: ASME B18.2.1/B18.2.3.8M.
- J. Wood Screws: ASME B18.6.1, flat head, carbon steel.

**2.6 ANCHORS**

- A. General: Provide anchors capable of sustaining, without failure, a load equal to 6 times load imposed when installed in unit masonry and 4 times load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- B. Cast-in-Place Anchors in Concrete: Bolts, washers, and shims as needed, either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel; hot-dip galvanized according to ASTM F 2329.
- C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.

1. Protected Areas:

- a. Steel: Carbon steel components zinc plated to comply with ASTM B 633 or ASTM F 1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
  - b. Stainless Steel: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593/F 738M; with hex nuts, ASTM F 594/F 836M; and, where indicated, flat washers; Alloy Group 1 (A1) for Type 304.
  - c. Locations: Where specified or where indicated on drawings.
2. Unprotected Areas: Stainless steel bolts, ASTM F 593/F 738M, and nuts, ASTM F 594/F 836M; and as follows:
- a. Alloy Group 1 (A1) for Type 304.
3. Post-Tensioned Concrete Locations: Anchors shall not exceed 1 in (25 mm) embedment. Obtain Structural Engineer's written approval for all proposed anchors in post-tensioned concrete prior to installation.

## **2.7 MANUFACTURED PRODUCTS**

### **A. Anti-Slip Coating:**

1. Description: Proprietary material and application process that forms permanent, uniform, slip resistant surface texture on metals.
2. Color: As selected from manufacturer/fabricators standard colors available.
3. Static Coefficient of Friction Characteristics: Not less than 0.6 according to ASTM D 2047.
4. Manufacturer/Fabricators:
  - a. IKG Industries, Division of Harsco Corporation.
  - b. SlipNOT Metal Safety Flooring, W. S. Molnar Company.

## **2.8 PAINT MATERIALS**

- A. Paint for Steel Fabrications: As specified in Division 09 Section "Painting".
- B. Galvanizing Repair Paint for Steel Fabrications in Unprotected Areas: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

## **2.9 ACCESSORY ITEMS**

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Concrete Materials and Properties: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with minimum 28 day compressive strength of 3000 psi (210.92 k/cm), unless otherwise indicated.
- C. Non-shrink, Non-metallic Grout: Factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer/fabricator.

## **2.10 FABRICATION, GENERAL**

- A. Fabrication Quality Standard for Fixed Ladders: In addition to standards listed elsewhere, comply with following, unless otherwise specified in this Section:
  1. Standard Ladders: ANSI A14.3.
  2. Elevator Pit Ladders: ASME A17.1.
- B. General: Fabricate metal fabrications, including clips, brackets, and other components necessary to support and anchor fabrications to supporting structure, and to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage.
  1. Join components by welding unless otherwise indicated.
- C. Shop Assembly: Assemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces.

D. Fabrication Requirements:

1. Shear and punch metals cleanly and accurately. Remove burrs and ease exposed edges to a radius of approximately 1/32 in (0.8 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
2. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
3. Form work true to line and level with accurate angles and surfaces and straight sharp edges.
4. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
5. Unprotected Areas:
  - a. Allow for thermal movement resulting from 120 deg F (49 deg C) change (range) in ambient and 180 deg F (82 deg C) surface temperatures by preventing buckling, opening up of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - b. Fabricate hot-dip galvanized fabrications so that field assembly will be by bolted connections and not welding.
  - c. Fabricate joints exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

E. Assembly Requirements:

1. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
2. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.
3. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/4 in by 1-1/4 in (6 mm by 31 mm), with a minimum 6 in (150 mm) embedment and 2 in (50 mm) hook, not less than 8 in (200 mm) from ends and corners of units and 24 in (600 mm) on center, unless otherwise indicated.
4. Complete fabrication prior to shop painting or hot-dip galvanizing.

F. Shop-Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings. Weld corners and seams continuously to develop full strength of member to comply with following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

## **2.11 SHELF ANGLES**

- A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4 in (19 mm) bolts, spaced not more than 6 in (150 mm) from ends and 24 in (600 mm) on center, unless otherwise indicated.
- B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete. Align expansion joints in angles with indicated control and expansion joints in cavity-wall exterior wythe.

## **2.12 MISCELLANEOUS FRAMING AND SUPPORTS**

- A. General: Provide steel framing and supports that are not a part of structural framework as necessary to complete the Work.
- B. Fabricate units from structural-steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
  - 1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors 1-1/4 in (32 mm) wide by 1/4 in (6 mm) thick by 8 in (200 mm) long at 24 in (600 mm) on center, unless otherwise indicated.

## **2.13 MISCELLANEOUS STEEL TRIM**

- A. Unless otherwise indicated, fabricate units from structural-steel shapes, plates, and bars of profiles shown with continuously welded joints, and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work. Provide anchors, welded to trim, for embedding in concrete or masonry construction, spaced not more than 6 in (150 mm) from each end, 6 in (150 mm) from corners, and 24 in (600 mm) on center, unless otherwise indicated.

## **2.14 FINISHES, GENERAL**

- A. Finish Quality Standard: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
  - 1. Finish metal fabrications after assembly.
  - 2. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

## **2.15 STEEL FINISHES**

- A. Unprotected Areas:
  - 1. Galvanized Finish: Hot-dip galvanize according to following. For surfaces to be painted, do not quench or apply post galvanizing treatments that might interfere with paint adhesion. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

- a. Steel and Iron Products: ASTM A 123.
  - b. Steel and Iron Hardware: ASTM A 153.
- 2. Cleaning: After galvanizing, thoroughly clean surfaces of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.
- B. Protected Areas:
  - 1. Shop Priming: Comply with Division 09 Section "Painting" and as follows:
    - a. Preparation of Uncoated Surfaces: Prepare uncoated surfaces to comply with requirements of coating product to be used, but not less than minimum requirements of SSPC-SP 6/NACE No. 3 surface preparation specifications and environmental exposure conditions of installed fabrications.
    - b. Application: SSPC-PA 1; apply shop primer to uncoated surfaces. Stripe paint corners, crevices, bolts, welds, and sharp edges.
- C. Field-Applied Coatings: As specified in Division 09 Section "Painting". Paint all steel fabrications unless noted otherwise.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive metal fabrications and associated Work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting Work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer/fabricator's written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer/fabricator's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

### **3.4 INSTALLATION OF METAL FABRICATIONS**

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, through bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- C. Connections at Unprotected Areas: Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of units that have been coated or finished after fabrication and are intended for bolted or screwed field connections or other means without further cutting or fitting.
- D. Field Welding: Weld connections continuously to develop full strength of member to comply with following requirements:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- E. Corrosion Protection: Coat concealed aluminum surfaces that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with heavy coat of bituminous paint.

### **3.5 INSTALLATION OF MISCELLANEOUS ITEMS**

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturer/fabricators' written instructions and requirements indicated on Shop Drawings.
- B. Stair Nosings at Cast-in-Place Concrete Stairs: Install with anchorage system to comply with manufacturer/fabricator's written instructions. Center nosings on tread widths to within 3 in (75 mm) of ends. Align nosings flush with riser faces and level with tread surfaces.

### **3.6 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.
  - 1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.

### **3.7 ADJUSTING AND CLEANING**

- A. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces. Apply by brush or spray to provide a minimum 2.0 mil (0.05 mm) dry film thickness.
- B. Galvanized Surfaces at Unprotected Areas: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

**END OF SECTION**

## **SECTION 05 5213**

### **PIPE AND TUBE RAILINGS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Pipe and tube railings and supplementary items necessary for installation.

##### **1.2 DEFINITIONS**

- A. Unprotected Areas: Exterior areas directly that are exposed to the elements such as rain, snow, or ice.
- B. Protected Areas: Interior and exterior areas that are not directly exposed to the elements such as rain, snow, or ice.

##### **1.3 DELEGATED ENGINEERING REQUIREMENTS**

- A. Contract Documents Design Intent: Drawings and Specifications indicate design intent for products and systems and do not necessarily indicate or specify total Work required. Contract Documents shall not be construed as an engineered design; furnish and install all Work required for a complete installation.
- B. Delegated Engineering Responsibility: Contractor shall employ a qualified professional engineer to provide engineering for products and systems including attachment to building structure required to meet design intent of Contract Documents.
  - 1. Preparation of structural analysis data including engineering calculations, shop drawings and other submittals signed and sealed by the qualified professional engineer.
- C. Delegated Engineering Professional Qualifications: Professional engineer legally authorized to practice in jurisdiction where Project is located and experienced in providing engineering services of kind indicated for products and systems similar to this Project and has a record of successful in-service performance.
- D. Coordination of Work:
  - 1. Product Variations: In the event of minor differences between products and systems of acceptable or available manufacturers, Contractor shall notify Architect of such differences and resolve conflicts in a timely manner. Failure of Contractor to provide notification shall be construed as acceptance of conditions indicated, and changes caused by minor differences between products and Contract Documents shall be included in the Work at no additional cost to Owner.

2. Allowable Adjustments: Minor dimension and profile adjustments may be made in interest of fabrication or erection methods or techniques or ability to satisfy design intent, provided design intent is maintained as determined by Architect. Proposed deviations shall include a detailed analysis of impact to adjacent substrates or other building systems, including related design or construction cost impacts. If accepted by Architect, deviations causing changes in materials, constructability, substrates, or conditions shall be included in the Work at no additional cost to Owner.

#### **1.4 ACTION SUBMITTALS**

- A. Product Data: Manufacturer/fabricator's technical literature for each product and system indicated.
  1. Include manufacturer/fabricator's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.
  1. For installed products indicated to comply with design loads, include shop drawings and structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Welding Certifications: Certificates for welding procedures and personnel.

#### **1.5 INFORMATIONAL SUBMITTALS**

- A. Delegated Engineering Calculations: Informational submittal for products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation; test reports are not acceptable substitute for calculations.
- B. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
- C. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".
- D. Manufacturer/Fabricator's Project Acceptance Document: Certification by the manufacturer/fabricator that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required.
- E. Qualification Data:
  1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.

#### **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.

B. Installer Qualifications:

1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.

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

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

## **1.7 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

## **1.8 PROJECT CONDITIONS**

- A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

## **1.9 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.
- B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

# **PART 2 - PRODUCTS**

## **2.1 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

## **2.2 PERFORMANCE REQUIREMENTS**

- A. General Performance: Engineer products and systems to withstand loads within limits of allowable working stresses of the materials involved under conditions indicated and without permanent deformation or failure of materials.
- B. Design Loads: Engineer to withstand design loads including, but not limited to, gravity, wind, seismic, and erection design loads and thermal movements established by authorities having jurisdiction, applicable local building codes, and as indicated.

1. Structural Movement: Engineer to withstand movements of structure including, but not limited to, drift, twist, column shortening, long-term creep and deflection from uniformly distributed and concentrated live loads. Contractor shall obtain required design data and identify movements accommodated on submittal drawings.
  2. In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:
    - a. Steel: 72 percent of minimum yield strength.
    - b. Aluminum: The lesser of minimum yield strength divided by 1.65 or minimum ultimate tensile strength divided by 1.95.
- C. Structural Performance: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
1. Handrails and Top Rails of Guards:
    - a. Uniform load of 50 lbf/ft. (0.73 kN/m) applied in any direction.
    - b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
    - c. Uniform and concentrated loads need not be assumed to act concurrently.
  2. Infill of Guards:
    - a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sf (0.093 sm).
    - b. Infill load and other loads need not be assumed to act concurrently.
- D. Thermal Movements at Exterior (Unprotected or Protected Areas): Engineer products and systems to accommodate thermal movements of supporting elements resulting from the following maximum change (range) in ambient and surface temperatures without buckling, damaging stresses, damaging loads on fasteners, failure of operating units to function properly, and other detrimental effects.
1. Temperature Change: 120 deg F (49 deg C), ambient; 180 deg F (82 deg C), material surfaces.
- E. Dimensional Tolerances: Engineer products and systems to accommodate dimensional tolerances of framing members and adjacent construction.

## 2.3 FERROUS METAL MATERIALS

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, blemishes, or other imperfections where exposed to view on finished units. Do not use steel sheet with variations in flatness exceeding those permitted by referenced standards for stretcher-leveled sheet. Unless indicated otherwise, provide the following:
1. Unprotected Areas: Galvanized metal.
  2. Protected Areas: Uncoated ferrous metal.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Steel Tubing: ASTM A 500 (cold formed) or ASTM A 513.

- D. Steel Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
- E. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

## **2.4 NON-FERROUS METAL MATERIALS**

- A. Aluminum Plate and Sheet: ASTM B 209/B 209M, Alloy 6061-T6.
- B. Aluminum Extrusions: ASTM B 221/B 221M, Alloy 6063-T6.
- C. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
- D. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

## **2.5 FASTENERS**

- A. General: Provide the following:
  - 1. Steel Pipe and Tube Railings at Protected Areas: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941 / F 1941M), Class Fe/Zn 5 for zinc coating.
  - 2. Steel Pipe and Tube Railings at Unprotected Areas: Hot-dip zinc-coated steel fasteners complying with ASTM A 153/A 153M or ASTM F 2329 for zinc coating; or stainless steel of the following type:
    - a. Type 304.
    - b. Type 316.
  - 3. Aluminum Pipe and Tube Railings at Protected and Unprotected Areas: stainless-steel fasteners of the following type:
    - a. Type 304.
    - b. Type 316.
- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

## **2.6 ANCHORS**

- A. General: Provide anchors capable of sustaining, without failure, a load equal to 6 times load imposed when installed in unit masonry and 4 times load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- B. Cast-in-Place Anchors in Concrete: Bolts, washers, and shims as needed, either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel; hot-dip galvanized according to ASTM F 2329.
- C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.

1. Protected Areas: Carbon steel components zinc plated to comply with ASTM B 633 or ASTM F 1941/F 1941M, Class Fe/Zn 5, unless otherwise indicated.
2. Unprotected Areas: Stainless steel bolts, ASTM F 593/F 738M, and nuts, ASTM F 594/F 836M; and as follows:
  - a. Alloy Group 1 (A1) for Type 304.
  - b. Alloy Group 2 (A4) for Type 316.
3. Post-Tensioned Concrete Locations: Anchors shall not exceed 1 in (25 mm) embedment. Obtain Structural Engineer's written approval for all proposed anchors in post-tensioned concrete prior to installation.

## **2.7 PAINT MATERIALS**

- A. Paint for Steel Pipe and Tube Railings: As specified in Division 09 Section "Painting".
- B. Galvanizing Repair Paint for Steel Pipe and Tube Railings at Unprotected Areas: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- C. Bituminous Paint for Aluminum Pipe and Tube Railings: ASTM D 1187, cold-applied asphalt emulsion.

## **2.8 ACCESSORY ITEMS**

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Fittings, Brackets, Fasteners, and Sleeves: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.
- C. Non-shrink, Non-metallic Grout: Factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer/fabricator.

## **2.9 FABRICATION, GENERAL**

- A. Fabrication Quality Standard: NAAMM AMP 521 for steel framed railings.
- B. General: Fabricate railings, including clips, brackets, and other components necessary to support and anchor railings to supporting structure, and to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
  1. Join components by welding unless otherwise indicated.
- C. Shop Assembly: Assemble railings in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces.
- D. Fabrication Requirements:

1. Cut, drill, and punch cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 in (0.8 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
  2. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
  3. Form work true to line and level with accurate angles and surfaces.
  4. Form changes in direction by bending or by inserting prefabricated elbow fittings.
  5. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
  6. Close exposed ends of railing members with prefabricated end fittings.
  7. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 in (6 mm) or less.
  8. Unprotected Areas:
    - a. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.
    - b. Fabricate hot-dip galvanized fabrications so that field assembly will be by bolted connections and not welding.
    - c. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- E. Shop-Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  2. Obtain fusion without undercut or overlap.
  3. Remove welding flux immediately.
  4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjacent surfaces.
- F. Brackets, Flanges, Fittings, and Anchors:
1. Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
  2. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.
  3. Interior Railings Supported from Plaster or Gypsum Board Walls: At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers, or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
- G. Fixed Railing Posts: If not coring concrete for railing posts to be set in concrete, provide stainless steel sleeves not less than 6 in (150 mm) long with inside dimensions not less than 1/2 in (12 mm) greater than outside dimensions of post, with metal plate forming bottom closure.

- H. Removable Railing Posts: Fabricate slip-fit sockets from stainless steel tube or pipe whose interior diameter is sized for a close fit with posts; limit movement of post without lateral load, measured at top, to not more than 1/40 of post height. Provide socket covers designed and fabricated to resist being dislodged.
- I. Gates: Form gates from steel tube of same size and shape as top rails, with infill to match guards. Provide with cam-type, self-closing hinges for fastening to wall and overlapping stop with rubber bumper to prevent gate from opening in direction opposite egress.

## **2.10 FINISHES, GENERAL**

- A. General Finish Quality Standard: NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
  - 1. Finish fabrications after assembly.
  - 2. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

## **2.11 STEEL AND IRON FINISHES**

- A. Unprotected Areas:
  - 1. Galvanized Finish: Hot-dip galvanize according to following. For surfaces to be painted, do not quench or apply post galvanizing treatments that might interfere with paint adhesion. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
    - a. Steel and Iron Products: ASTM A 123.
    - b. Steel and Iron Hardware: ASTM A 153.
  - 2. Cleaning: After galvanizing, thoroughly clean surfaces of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.
- B. Protected Areas:
  - 1. Shop Priming: Comply with Division 09 Section "Painting" and as follows:
    - a. Preparation of Uncoated Surfaces: Prepare uncoated surfaces to comply with requirements of coating product to be used, but not less than minimum requirements of SSPC-SP 6/NACE No. 3 surface preparation specifications and environmental exposure conditions of installed fabrications.
    - b. Application: SSPC-PA 1; apply shop primer to uncoated surfaces. Stripe paint corners, crevices, bolts, welds, and sharp edges.
- C. Field-Applied Coatings: As specified in Division 09 Section "Painting". Paint all steel pipe and tube railings unless noted otherwise.

## **2.12 ALUMINUM FINISHES**

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Mechanical Finish: AA-M12 (Mechanical Finish: nonspecular as fabricated).

- C. Clear Anodic Finish:
  - a. Unprotected Areas: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
  - b. Protected Areas: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.
  
- D. Color Anodic Finish:
  - a. Unprotected Areas: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
    - 1) Color: Light bronze.
    - 2) Color: Medium bronze.
    - 3) Color: Dark bronze.
    - 4) Color: Black.
    - 5) Color: Match Architect's sample.
  - b. Protected Areas: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.
    - 1) Color: Light bronze.
    - 2) Color: Medium bronze.
    - 3) Color: Dark bronze.
    - 4) Color: Black.
    - 5) Color: Match Architect's sample.
  
- E. Baked-Enamel or Powder-Coat Finish for Protected Areas: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
  - 1. Color and Gloss: As scheduled or as indicated in Design Selections.
  - 2. Color and Gloss: Match Architect's sample.
  
- F. High-Performance Organic Finish for Unprotected Areas: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  - 1. Color and Gloss: As scheduled or as indicated in Design Selections.
  - 2. Color and Gloss: Match Architect's sample.
  
- G. High-Performance Organic Finish for Unprotected Areas: Three-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  - 1. Color and Gloss: As scheduled or as indicated in Design Selections
  - 2. Color and Gloss: Match Architect's sample.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.
  - 1. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer/fabricator's written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer/fabricator's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors, which would result in poor or potentially defective installation or would cause latent defects in Work.

### **3.4 INSTALLATION OF PIPE AND TUBE RAILINGS**

- A. Cutting, Fitting, and Placement:
  - 1. Perform cutting, drilling, and fitting required for installing railings. Set accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; measured from established lines and levels and free of rack.
  - 2. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
- B. General Installation Requirements:
  - 1. Fit exposed connections together to form tight, hairline joints.
  - 2. Adjust railings before anchoring to ensure matching alignment at abutting joints.
  - 3. Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.
  - 4. Aluminum Pipe and Tube Railings: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of

- C. Field Welding: Weld connections continuously to develop full strength of member to comply with following:
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  2. Obtain fusion without undercut or overlap.
  3. Remove welding flux immediately.
  4. Weld exposed corners and seams continuously unless otherwise indicated.
  5. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Non-welded Connections for Aluminum Pipe and Tube Railings: Use mechanical or adhesive joints for permanently connecting railing components. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.
- E. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 in (50 mm) beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 in (150 mm) of post.
- F. Anchoring Posts in Concrete:
1. Anchor posts according to one of following:
    - a. Metal sleeves preset and anchored into concrete.
    - b. Form or core-drill holes not less than 5 in (125 mm) deep and 3/4 in (19 mm) larger than outside diameter of post; clean holes of loose material.
  2. Fill annular space between post and concrete or metal sleeves with non-shrink, non-metallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer/fabricator's written instructions.
  3. Leave anchorage joint exposed with 1/8 in (3 mm) buildup, sloped away from post.
- G. Anchoring Posts onto Concrete: Attach flange to concrete using post-installed anchors in pre-drill holes, welded or attached with set screws to post.
- H. Anchoring Posts onto Steel:
1. Flanges: Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members.
  2. Steel Pipe and Tube Railings: Weld flanges to post and bolt to metal supporting surfaces.
  3. Aluminum Pipe and Tube Railings: Use fittings designed and engineered for this purpose.
- I. Installing Removable Posts: Install in slip-fit metal sockets cast in concrete.
- J. Attaching Railings to Walls: Except where end flanges are used, attach with wall brackets with 1-1/2 in (38 mm) clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads. Secure with following devices:

1. Concrete and Solid Masonry: Post-installed anchors.
2. Hollow Masonry: Toggle bolts.
3. Gypsum Board Assemblies: Toggle bolts installed through flanges of steel framing or through concealed steel reinforcements.

K. Tolerances:

1. Posts: Set plumb within a tolerance of 1/16 in per 3 ft (1.5 mm per 900 mm).
2. Rails: Align so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 in per 12 ft (6 mm per 3.6 m).

### **3.5 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.
1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.
- B. Testing Agency Field Service: The Owner may employ and pay a qualified independent testing agency to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense.

### **3.6 ADJUSTING AND CLEANING**

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces. Apply by brush or spray to provide a minimum 2.0 mil (0.05 mm) dry film thickness.
- B. Galvanized Surfaces at Unprotected Areas: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

### **END OF SECTION**

## **SECTION 05 5300**

### **METAL GRATINGS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Metal gratings and supplementary items required for installation.

##### **1.2 DEFINITIONS**

- A. Unprotected Areas: Exterior areas directly that are exposed to the elements such as rain, snow, or ice.
- B. Protected Areas: Interior and exterior areas that are not directly exposed to the elements such as rain, snow, or ice.

##### **1.3 DELEGATED ENGINEERING REQUIREMENTS**

- A. Contract Documents Design Intent: Drawings and Specifications indicate design intent for products and systems and do not necessarily indicate or specify total Work required. Contract Documents shall not be construed as an engineered design; furnish and install all Work required for a complete installation.
- B. Delegated Engineering Responsibility: Contractor shall employ a qualified professional engineer to provide engineering for products and systems including attachment to building structure required to meet design intent of Contract Documents.
  - 1. Preparation of structural analysis data including engineering calculations, shop drawings and other submittals signed and sealed by the qualified professional engineer.
- C. Delegated Engineering Professional Qualifications: Professional engineer legally authorized to practice in jurisdiction where Project is located and experienced in providing engineering services of kind indicated for products and systems similar to this Project and has a record of successful in-service performance.
- D. Coordination of Work:
  - 1. Product Variations: In the event of minor differences between products and systems of acceptable or available manufacturers, Contractor shall notify Architect of such differences and resolve conflicts in a timely manner. Failure of Contractor to provide notification shall be construed as acceptance of conditions indicated, and changes caused by minor differences between products and Contract Documents shall be included in the Work at no additional cost to Owner.

2. Allowable Adjustments: Minor dimension and profile adjustments may be made in interest of fabrication or erection methods or techniques or ability to satisfy design intent, provided design intent is maintained as determined by Architect. Proposed deviations shall include a detailed analysis of impact to adjacent substrates or other building systems, including related design or construction cost impacts. If accepted by Architect, deviations causing changes in materials, constructability, substrates, or conditions shall be included in the Work at no additional cost to Owner.

#### **1.4 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.
  1. Provide templates for anchors and bolts specified for installation under other Sections.
  2. For installed products indicated to comply with design loads, include shop drawings and structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### **1.5 INFORMATIONAL SUBMITTALS**

- A. Welding Certifications: Certificates for welding procedures and personnel.
- B. Delegated Engineering Calculations: Informational submittal for products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation; test reports are not acceptable substitute for calculations.
- C. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
- D. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".
- E. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required.
- F. Qualification Data:
  1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
- G. Mill Certificates for Type 316 Stainless Steel: Signed by manufacturer of stainless-steel certifying that products furnished comply with requirements.

## **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Installer Qualifications:
  - 1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  - 2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
  - 3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel".
  - 2. AWS D1.3, "Structural Welding Code - Sheet Steel".
  - 3. AWS D1.6, "Structural Welding Code - Stainless Steel".
  - 4. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum".
- D. Metal Bar Grating Standards: Comply with the following as appropriate:
  - 1. NAAMM MBG 531, "Metal Bar Grating Manual".
  - 2. NAAMM MBG 532, "Heavy-Duty Metal Bar Grating Manual".

## **1.7 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

## **1.8 PROJECT CONDITIONS**

- A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

## **1.9 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.
- B. Coordinate installation of anchorages for metal gratings. Furnish setting drawings, templates, and directions for installing anchorages, including concrete inserts, anchor bolts, and items with integral anchors that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
- A. Available Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those listed.
  - 1. Alabama Metal Industries Corporation; a Gibraltar Industries company.
  - 2. IKG Industries; a division of Harsco Corporation.
  - 3. McNichols Co.
  - 4. Ohio Gratings, Inc.

### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

### **2.3 PERFORMANCE REQUIREMENTS**

- A. General Performance: Engineer products and systems to withstand loads within limits of allowable working stresses of the materials involved under conditions indicated and without permanent deformation or failure of materials.
- B. Design Loads: Engineer to withstand design loads including, but not limited to, gravity, wind, seismic, and erection design loads and thermal movements established by authorities having jurisdiction, applicable local building codes, and as indicated.
  - 1. Structural Movement: Engineer to withstand movements of structure including, but not limited to, drift, twist, column shortening, long-term creep and deflection from uniformly distributed and concentrated live loads. Contractor shall obtain required design data and identify movements accommodated on submittal drawings.
  - 2. Floor Gratings: Uniform load of 125 lbf/sf (6.00 kN/sm) or concentrated load of 2000 lbf (8.90 kN), whichever produces the greater stress.
  - 3. Gratings in Walkways and Elevated Platforms Used as Exits: Uniform load of 100 lbf/sf (4.79 kN/sm).
  - 4. Gratings in Sidewalks and Vehicular Driveways, Subject to Trucking: Uniform load of 250 lbf/sf (11.97 kN/sm) or concentrated load of 8000 lbf (35.60 kN), whichever produces the greater stress.
  - 5. Limit deflection to L/360 or 1/4 in (6 mm), whichever is less.
- C. Thermal Movements: Engineer products and systems to accommodate thermal movements of supporting elements resulting from the following maximum change (range) in ambient and surface temperatures without buckling, damaging stresses, damaging loads on fasteners, failure of operating units to function properly, and other detrimental effects.

1. Temperature Change (Range): 120 deg F (49 deg C), ambient; 180 deg F (82 deg C), material surfaces.

- D. Dimensional Tolerances: Engineer products and systems to accommodate dimensional tolerances of framing members and adjacent construction.

## **2.4 STEEL MATERIALS**

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Bars for Bar Gratings: ASTM A 36/A 36M or steel strip, ASTM A 1011/A 1011M or ASTM A 1018/A 1018M.
- C. Wire Rod for Bar Grating Crossbars: ASTM A 510 (ASTM A 510M).

## **2.5 STAINLESS STEEL MATERIALS**

- A. Stainless Steel for Protected Areas:
1. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304.
  2. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- B. Stainless Steel for Unprotected Areas:
1. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304.
  2. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- C. Stainless Steel for Unprotected Areas:
1. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 316.
  2. Stainless-Steel Bars and Shapes: ASTM A 276, Type 316.

## **2.6 ALUMINUM MATERIALS**

- A. Aluminum, General: Provide alloy and temper recommended by aluminum producer for type of use indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.
- B. Extruded Bars and Shapes: ASTM B 221 / B 221M, alloys as follows:
1. 6061-T6 or 6063-T6, for bearing bars of gratings and shapes.
  2. 6061-T1, for grating crossbars.

## **2.7 FASTENERS**

- A. Fastener Type and Material: Select fasteners for type, grade, and class required to produce connections suitable for anchoring gratings to other types of construction indicated and capable of withstanding design loads.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A/ F 568M, Property Class 4.6; with hex nuts, ASTM A 563/ A 563M; and, where indicated, flat washers.

- C. Bolts and Nuts:
  - 1. Protected Areas: Regular hexagon-head bolts, ASTM A 307, Grade A / F 568M, Property Class 4.6; with hex nuts, ASTM A 563 / A 563M; and, where indicated, flat washers.
  - 2. Unprotected Areas: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593/F 738M; with hex nuts, ASTM F 594/F 836M; and, where indicated, flat washers and as follows:
    - a. Alloy Group 1 (A1) for Type 304.
    - b. Alloy Group 2 (A4) for Type 316.
- D. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563/ A 563M; and, where indicated, flat washers. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- E. Plain Washers: Round carbon steel, ASME B18.22.1/ASME B18.22M.
- F. Lock Washers: Helical, spring type carbon steel, ASME B18.21.1/ASME B18.21.2M.

## 2.8 ANCHORS

- A. General: Provide anchors capable of sustaining, without failure, a load equal to 6 times load imposed when installed in unit masonry and 4 times load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- B. Cast-in-Place Anchors in Concrete: Bolts, washers, and shims as needed, either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel; hot-dip galvanized according to ASTM F 2329.
- C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
  - 1. Protected Areas: Carbon steel components zinc plated to comply with ASTM B 633 or ASTM F 1941/F 1941M, Class Fe/Zn 5, unless otherwise indicated.
  - 2. Unprotected Areas: Stainless steel bolts, ASTM F 593/F 738M, and nuts, ASTM F 594/F 836M; and as follows:
    - a. Alloy Group 1 (A1) for Type 304.
    - b. Alloy Group 2 (A4) for Type 316.
  - 3. Post-Tensioned Concrete Locations: Anchors shall not exceed 1 in (25 mm) embedment. Obtain Structural Engineer's written approval for all proposed anchors in post-tensioned **concrete prior to installation.**

## 2.9 PAINT MATERIALS

- A. Paint for Steel Gratings: As specified in Division 09 Section "Painting".
- B. Galvanizing Repair Paint for Steel Gratings at Unprotected Areas: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

- C. Bituminous Paint for Aluminum Gratings: ASTM D 1187, cold-applied asphalt emulsion.

## **2.10 ACCESSORY ITEMS**

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

## **2.11 FABRICATION, GENERAL**

- A. Shop Assembly: Fabricate grating sections in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch material cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 in (0.8 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form from materials of size, thickness, and shapes indicated, but not less than that needed to support indicated loads.
- D. Fit exposed connections accurately together to form hairline joints.
- E. Shop-Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings. Weld corners and seams continuously to develop full strength of member to comply with following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surfaces.
- F. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space the anchoring devices to secure gratings, frames, and supports rigidly in place and to support indicated loads.
  - 1. Fabricate toeplates to fit grating units and weld to units in shop unless otherwise indicated.
  - 2. Toeplate Height: 4 in (100 mm) unless otherwise indicated.

## **2.12 METAL BAR GRATINGS**

- A. Welded Steel Grating:
  - 1. Bearing Bar Spacing: 1-3/16 in (30 mm) on center, except at walking surfaces.
  - 2. Bearing Bar Depth: As required to comply with structural performance requirements.
  - 3. Bearing Bar Thickness: As required to comply with structural performance requirements.
  - 4. Crossbar Spacing: 4 in (100 mm) on center.
  - 5. Traffic Surface: Plain.

6. Finish:
  - a. Protected Areas: Shop primed.
  - b. UnProtected Areas: Hot-dip galvanized with a coating weight of not less than 1.8 oz./sq. ft. (550 g/sq. m) of coated surface.
  
- B. Pressure-Locked, Stainless-Steel Grating: Fabricated by pressing rectangular flush-top crossbars into slotted bearing bars or swaging crossbars between bearing bars.
  1. Bearing Bar Spacing: 1-3/16 in (30 mm) on center, except at walking surfaces.
  2. Bearing Bar Depth: As required to comply with structural performance requirements.
  3. Bearing Bar Thickness: As required to comply with structural performance requirements.
  4. Crossbar Spacing: 4 in (100 mm) on center.
  5. Finish: As specified elsewhere in this Section.
  
- C. Pressure-Locked, Rectangular Bar Aluminum Grating: Fabricated by pressing rectangular flush-top crossbars into slotted bearing bars or swaging crossbars between bearing bars.
  1. Bearing Bar Spacing: 1-3/16 in (30 mm) on center, except at walking surfaces.
  2. Bearing Bar Depth: As required to comply with structural performance requirements.
  3. Bearing Bar Thickness: As required to comply with structural performance requirements.
  4. Crossbar Spacing: 4 in (100 mm) on center.
  5. Finish: As specified elsewhere in this Section.
  
- D. Metal Gratings in Walking Surfaces: Fabricate metal gratings with bearing bars spaced with 1/4 in (6 mm) maximum spacing between bars to meet ADA requirements. Arrange so that bearing bars are perpendicular to the dominant direction of travel.
  
- E. Removable Grating Sections: Fabricate with banding bars attached by welding to entire perimeter of each section. Include anchors and fasteners of type indicated or, if not indicated, as recommended by manufacturer for attaching to supports.
  1. Provide no fewer than four saddle clips for each grating section composed of rectangular bearing bars 3/16 in (5 mm) or less in thickness and spaced 15/16 in (24 mm) or more on center, with each clip designed and fabricated to fit over two bearing bars.
  2. Furnish threaded bolts with nuts and washers for securing grating to supports.
  
- F. Fabricate cutouts in grating sections for penetrations indicated. Arrange cutouts to permit grating removal without disturbing items penetrating gratings.
  1. Edge-band openings in grating that interrupt four or more bearing bars with bars of same size and material as bearing bars.
  
- G. Do not notch bearing bars at supports to maintain elevation.

## **2.13 GLASS-FIBER-REINFORCED PLASTIC GRATINGS**

- A. Refer to Division 06 Section "Plastic Gratings" for glass-fiber-reinforced plastic gratings for elevator sump pits.

## **2.14 CAST IRON TRENCH GRATINGS**

- A. Cast iron pan and grate for transverse drainage system.
  - 1. Material: Gray Iron, Class 35 for heavy duty use.
  - 2. Product Standard (Design Basis): Neenah Foundry Co. Model R-4996-A1.
  - 3. Grate: Type P.
  - 4. Frame: Type M.
  - 5. Opening: 11.5 in (292 mm).
  - 6. Location: Bottom of ramps at parking garage.

## **2.15 GRATING FRAMES AND SUPPORTS**

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

## **2.16 FINISHES, GENERAL**

- A. Finish Quality Standard: NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
  - 1. Finish fabrications after assembly.
  - 2. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

## **2.17 STEEL FINISHES**

- A. Unprotected Areas:
  - 1. Galvanized Finish: Hot-dip galvanize according to following. For surfaces to be painted, do not quench or apply post galvanizing treatments that might interfere with paint adhesion. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
    - a. Steel and Iron Products: ASTM A 123.
    - b. Steel and Iron Hardware: ASTM A 153.
  - 2. Cleaning: After galvanizing, thoroughly clean surfaces of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.
- B. Protected Areas:

1. Shop Priming: Comply with Division 09 Section "Painting" and as follows:
  - a. Preparation of Uncoated Surfaces: Prepare uncoated surfaces to comply with requirements of coating product to be used, but not less than minimum requirements of SSPC-SP 6/NACE No. 3 surface preparation specifications and environmental exposure conditions of installed fabrications.
  - b. Application: SSPC-PA 1; apply shop primer to uncoated surfaces. Stripe paint corners, crevices, bolts, welds, and sharp edges.
- C. Field-Applied Coatings: As specified in Division 09 Section "Painting". Paint all steel gratings **unless noted otherwise**.

## 2.18 STAINLESS STEEL FINISHES

- A. Stainless Steel Gratings: As-fabricated finish.

## 2.19 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. As-Fabricated Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified).

# PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

## 3.2 INSTALLATION, GENERAL

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  1. Respective manufacturer's written installation instructions.
  2. Accepted submittals.
  3. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

## 3.3 PREPARATION

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

### **3.4 INSTALLATION OF METAL GRATINGS, GENERAL**

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing gratings to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing gratings. Set accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; measured from established lines and levels.
- C. Connections at Unprotected Areas: Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of units that have been coated or finished after fabrication and are intended for bolted or screwed field connections or other means without further cutting or fitting.
- D. Field Welding: Weld connections continuously to develop full strength of member to comply with the following requirements:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove flux immediately.
  - 4. Weld exposed corners and seams continuously unless otherwise indicated.
  - 5. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or masonry.
- F. Toeplates: Attach toeplates to gratings by welding at locations indicated.
- G. Corrosion Protection for Aluminum Gratings: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

### **3.5 INSTALLATION OF 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. Removable Grating Sections: 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 non-removable units to supporting members by welding where both materials are same; otherwise, fasten by bolting as indicated above.

### 3.6 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.
  - 1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.
- B. Owner's Testing Agency Field Service: The Owner may employ and pay a qualified independent testing agency to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense.

### 3.7 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces. Apply by brush or spray to provide a minimum 2.0 mil (0.05 mm) dry film thickness.
- B. Galvanized Surfaces at Unprotected Areas: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

**END OF SECTION**

**SECTION 057000**  
**ORNAMENTAL METAL**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes: Ornamental metal including formed metal used for general purposes and supplementary items necessary to complete their installation.

**1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.
  - 1. Indicate materials and profiles of each ornamental formed metal member, fittings, joinery, finishes, fasteners, anchorages, and accessory items.
- C. Samples for Initial Selection: For products involving selection of color, texture, or design, including mechanical finishes.
- D. Samples for Verification: For each type of exposed finish required, prepared on 6 in (150 mm) square Samples of metal of same thickness and material indicated for the Work.
- E. Coordination Drawings: For ornamental metal elements that house items specified in other Sections. Show dimensions of housed items, including locations of housing penetrations and attachments, and necessary clearances.

**1.3 INFORMATIONAL SUBMITTALS**

- A. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
- B. Welding certificates.

**1.4 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: To include in maintenance manuals.

**1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Installer Qualifications:
  - 1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  - 2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
- C. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.
  - 1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.
    - a. Show typical components, attachments to building structure, and requirements of installation.
  - 2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
  - 3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
  - 4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
  - 5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.
- D. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
  - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
  - 3. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."
  - 4. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

## **1.6 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

## **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver ornamental metal products wrapped in protective coverings and strapped together in suitable packs or in heavy-duty cartons. Remove protective coverings before they stain or bond to finished surfaces.
- B. Store products on elevated platforms in a dry location.

## **1.8 PROJECT CONDITIONS**

- A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

## **1.9 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

### **2.2 METALS, GENERAL**

- A. Metal Surfaces, General: Use materials with smooth, flat surfaces unless otherwise indicated. Use materials without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

### **2.3 ALUMINUM**

- A. Fabricate products from alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties for each aluminum form required not less than that of alloy and temper designated below.
- B. Bars and Shapes: ASTM B 221 (ASTM B 221M), Alloy 6063-T5/T52.
- C. Pipe and Round Tubing: ASTM B 429/B 429M, Alloy 6063-T6.
- D. Tubing: ASTM B 210 (ASTM B 210M), Alloy 6063-T832.
- E. Plate: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and considering Alloy 3003-H14 for coating finish, Alloy 5005-H32 for anodized finish, and Alloy 6061-T6 for high strength.
- F. Aluminum Sheet: Flat sheet complying with ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than strength and durability properties of Alloy 5005-H32.
- G. Forgings: ASTM B 247 (ASTM B 247M), Alloy 6061-T6.
- H. Castings: ASTM B 26/B 26M, Alloy A356.0-T6.

### **2.4 STAINLESS STEEL**

- A. Tubing: ASTM A 554:
  - 1. Grade: MT 304
  - 2. Grade: MT 316 or MT 316L

- B. Pipe: ASTM A 312/A 312M:
  - 1. Grade: MT 304
  - 2. Grade: MT 316 or MT 316L
- C. Castings: ASTM A 743/A 743M:
  - 1. Grade: Grade CF 8 or Grade CF 20
  - 2. Grade: Grade CF 8M or Grade CF 3M
- D. Strip, Plate, and Flat Bar: ASTM A 666:
  - 1. Grade: MT 304
  - 2. Grade: MT 316 or MT 316L
- E. Stainless-Steel Sheet for Interior Items: ASTM A 240/A 240M or ASTM A 666, Type 304, stretcher-leveled standard of flatness.
- F. Stainless-Steel Sheet for Exterior Items: ASTM A 240/A 240M or ASTM A 666, Type 316, stretcher-leveled standard of flatness.
- G. Bars and Shapes: ASTM A 276:
  - 1. Grade: MT 304
  - 2. Grade: MT 316 or MT 316L
- H. Wire Rope and Fittings:
  - 1. Manufacturers:
    - a. Cable Connection (The).
    - b. Carl Stahl DecorCable, Inc.
    - c. Esmet, Inc.
    - d. Feeney, Inc.
    - e. Hayn Enterprises, LLC.
    - f. Johnson, C. Sherman, Co., Inc.
    - g. Loos & Co., Inc.; Cableware Division.
    - h. Ronstan International Inc.
    - i. Secosouth, Inc.
  - 2. Wire Rope: 1-by-19 wire rope made from wire complying with ASTM A 492, Type 316.
  - 3. Wire-Rope Fittings: Connectors of types indicated, fabricated from stainless steel, and with capability to sustain without failure a load equal to minimum breaking strength of wire rope with which they are used.

## **2.5 STEEL AND IRON**

- A. Tubing: ASTM A 500/A 500M (cold formed) or ASTM A 513, Type 5 (mandrel drawn).
- B. Bars: Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.
- C. Plates, Shapes, and Bars: ASTM A 36/A 36M.

- D. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M unless otherwise indicated.
- E. Galvanized-Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating, either commercial steel or forming steel.
- F. Steel Sheet: Uncoated, cold-rolled, ASTM A 1008/A 1008M, commercial steel, exposed or electrolytic zinc-coated, ASTM A 879/A 879M, with steel sheet substrate complying with ASTM A 1008/A 1008M, commercial steel, exposed.

## **2.6 MISCELLANEOUS MATERIALS**

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
  - 1. For aluminum, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- B. Brazing Rods: For copper alloys, provide type and alloy as recommended by producer of metal to be brazed and as required for color match, strength, and compatibility in fabricated items.
- C. Sealants, Exterior: ASTM C 920; elastomeric silicone sealant; of type, grade, class, and use classifications required to seal joints in ornamental formed metal and remain weathertight; and as recommended in writing by ornamental formed metal manufacturer.
- D. Sealants, Interior: Nonsag, paintable, nonstaining, latex sealant complying with ASTM C 834; of type and grade required to seal joints in ornamental formed metal; and as recommended in writing by ornamental formed metal manufacturer.
  - 1. Sealants shall have a VOC content of not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  - 2. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. Fasteners: Fabricated from same basic metal and alloy as fastened metal unless otherwise indicated. Do not use metals that are incompatible with materials joined.
  - 1. Provide concealed fasteners for interconnecting ornamental formed metal items and for attaching them to other work unless exposed fasteners are unavoidable or are the standard fastening method.
  - 2. Provide Phillips flat-head machine screws for exposed fasteners unless otherwise indicated.
- F. Nonstructural Anchors: Provide powder-actuated fasteners, metal expansion sleeve anchors, or metal-impact expansion anchors of type, size, and material necessary for type of load and installation indicated, as recommended by manufacturer, unless otherwise indicated.
- G. Anchor Materials:
  - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.

2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).
- H. Backing Materials: Provided or recommended by ornamental formed metal manufacturer.
- I. Laminating Adhesive: Adhesive recommended by metal fabricator that will fully bond metal to metal and that will prevent telegraphing and oil canning and is compatible with substrate and noncombustible after curing.
1. Contact Adhesive: VOC content of not more than 80 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  2. Metal-to-Metal Adhesive: VOC content of not more than 30 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  3. Multipurpose Construction Adhesive: VOC content of not more than 70 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  4. Special-Purpose Contact Adhesive: (Contact adhesive used to bond melamine-covered board, metal, unsupported vinyl, ultrahigh molecular weight polyethylene, and rubber or wood veneer, 1/16 in (1.5 mm) thick or less, to any surface): 250 g/L.
  5. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- J. Isolation Coating: Manufacturer's standard alkali-resistant coating, bituminous paint, or epoxy coating.
1. Coating shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

## **2.7 PAINTS AND COATINGS**

- A. Low-Emitting Materials for Schools: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- D. Lacquer for Copper Alloys: Clear, acrylic lacquer specially developed for coating copper-alloy products.
- E. Shop Primers: Comply with Division 09 Section "Painting".
- F. Shop Primers: Comply with Division 09 Section "High-Performance Coatings".
- G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

## **2.8 FABRICATION, GENERAL**

- A. Shop Assembly: Preassemble ornamental metal items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- B. Make up wire-rope assemblies in the shop to field-measured dimensions with fittings machine swaged. Minimize amount of turnbuckle take-up used for dimensional adjustment so maximum amount is available for tensioning wire ropes. Tag wire-rope assemblies and fittings to identify installation locations and orientations for coordinated installation.
- C. Form ornamental metal to required shapes and sizes, true to line and level with true curves and accurate angles and surfaces. Finish exposed surfaces to smooth, sharp, well-defined lines and arris.
- D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.
- E. Form simple and compound curves in bars, pipe, tubing, and extruded shapes by bending members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces.
- F. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 in (0.8 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- G. Mill joints to a tight, hairline fit. Cope or miter corner joints. Fabricate connections that will be exposed to weather in a manner to exclude water.
- H. Provide weep holes where water may accumulate. Locate weep holes in inconspicuous locations.
- I. Provide necessary rebates, lugs, and brackets to assemble units and to attach to other work. Cut, reinforce, drill, and tap as needed to receive finish hardware, screws, and similar items unless otherwise indicated.
- J. Comply with AWS for recommended practices in shop welding and brazing. Weld and braze behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed joints of flux, and dress exposed and contact surfaces.
  - 1. Where welding and brazing cannot be concealed behind finished surfaces, finish joints to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 Welds: no evidence of a welded joint.
- K. Provide castings that are sound and free of warp, cracks, blowholes, or other defects that impair strength or appearance. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks.
- L. Coordinate dimensions and attachment methods of ornamental metal items with those of adjoining construction to produce integrated assemblies with closely fitting joints and with edges and surfaces aligned unless otherwise indicated.

- M. Form metal to profiles indicated, in maximum lengths to minimize joints. Produce flat, flush surfaces without cracking or grain separation at bends. Fold back exposed edges of unsupported sheet metal to form a 1/2 in (12 mm) wide hem on the concealed side, or ease edges to a radius of approximately 1/32 in (0.8 mm) and support with concealed stiffeners.
- N. Increase metal thickness or reinforce with concealed stiffeners, backing materials, or both, as needed to provide surface flatness equivalent to stretcher-leveled standard of flatness and sufficient strength for indicated use.
- O. Support joints with concealed stiffeners as needed to hold exposed faces of adjoining sheets in flush alignment.
- P. Build in straps, plates, and brackets as needed to support and anchor fabricated items to adjoining construction. Reinforce ornamental formed metal items as needed to attach and support other construction.
- Q. Provide support framing, mounting and attachment clips, splice sleeves, fasteners, and accessories needed to install ornamental formed metal items.

## **2.9 ORNAMENTAL WINDOW SECURITY BARS**

- A. General: Fabricate ornamental window grilles to designs indicated from steel bars and shapes of sizes and profiles indicated. Form steel bars by bending, forging, coping, mitering, and welding.
- B. Welding: Interconnect grille members with full-length, full-penetration welds unless otherwise indicated. Use welding method that is appropriate for metal and finish indicated and that develops full strength of members joined. Finish exposed welds and surfaces smooth, flush, and blended to match adjoining surfaces.
- C. Brackets, Fittings, and Anchors: Provide wall brackets, fittings, and anchors to connect ornamental window grilles to other work unless otherwise indicated.
  - 1. Furnish inserts and other anchorage devices to connect ornamental window grilles to concrete and masonry work. Coordinate anchorage devices with supporting structure.
  - 2. Fabricate anchorage devices that are capable of withstanding loads indicated.

## **2.10 METAL REVEALS**

- A. Fabricate metal reveals for wood paneling and/or cabinets from materials, shapes and sizes indicated on the Drawings. Anchor to provide permanent attachment to substrate using fasteners and or adhesives.

## **2.11 METAL BASE**

- A. Fabricate metal base from materials, shapes and sizes indicated on the Drawings. Anchor to provide permanent attachment to substrate using fasteners and or adhesives.
- B. Form metal base from metal of type and thickness indicated below:
  - 1. Aluminum Sheet: 0.063 in (1.60 mm).
    - a. Finish: As indicated in the Design Selections.

2. Stainless-Steel Sheet: 0.050 in (1.25 mm).
  - b. Finish: As indicated in the Design Selections.

## **2.12 GENERAL FINISH REQUIREMENTS**

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Mechanical Finishes:
  1. Complete mechanical finishes of flat sheet metal surfaces before fabrication where possible. After fabrication, finish all joints, bends, abrasions, and other surface blemishes to match sheet finish.
  2. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Apply organic and anodic finishes to formed metal after fabrication unless otherwise indicated.
- H. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## **2.13 ALUMINUM FINISHES**

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  1. Color: As scheduled or as indicated in Design Selections.
- C. High-Performance Organic Finish: Three-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  1. Color: As scheduled or as indicated in Design Selections.
- D. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
  1. Color: As scheduled or as indicated in Design Selections.
- E. Siliconized Polyester Finish: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil (0.005 mm) for primer and 0.8 mil (0.02 mm) for topcoat.

1. Color: As scheduled or as indicated in Design Selections.
- F. Clear Anodic Finish for Exterior Units: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
- G. Clear Anodic Finish for Interior Units: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.
- H. Color Anodic Finish for Exterior Units: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
1. Color: As scheduled or as indicated in Design Selections.
- I. Color Anodic Finish for Interior Units: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.
1. Color: As scheduled or as indicated in Design Selections.

## **2.14 GALVANIZED-STEEL FINISHES**

- A. Preparing Galvanized Items for Factory Priming: Thoroughly clean galvanized ornamental formed metal of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.
- B. Preparing Galvanized Items for Factory Finishing: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it.
- C. Repairing Galvanized Surfaces: Clean welds and abraded areas and repair galvanizing to comply with ASTM A 780.
- D. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
1. Color: As scheduled or as indicated in Design Selections.
- E. High-Performance Organic Finish: Three-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
1. Color: As scheduled or as indicated in Design Selections.
- F. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil (0.025 mm) for topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).
1. Color: As scheduled or as indicated in Design Selections.

- G. Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than 1.5 mils (0.04 mm). Prepare, treat, and coat metal to comply with resin manufacturer's written instructions.
  - 1. Color: As scheduled or as indicated in Design Selections.
- H. Siliconized-Polyester Coating: Immediately after cleaning and pretreating, apply manufacturer's standard epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil (0.005 mm) for primer and 0.8 mil (0.02 mm) for topcoat.
  - 1. Color: As scheduled or as indicated in Design Selections.
- I. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply shop primer to prepared surfaces of items unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
  - 1. Field-Applied Coatings: As specified in Division 09 Section "Painting".
  - 2. Field-Applied Coatings: As specified in Division 09 Section "High-Performance Coatings".

## **2.15 STEEL FINISHES**

- A. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or with SSPC-SP 8, "Pickling."
- B. Pretreatment: Immediately after cleaning, apply a conversion coating of type suited to organic coating applied over it.
- C. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).
  - 1. Color: As scheduled or as indicated in Design Selections.
- D. Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than 1.5 mils (0.04 mm). Prepare, treat, and coat metal to comply with resin manufacturer's written instructions.
  - 1. Color: As scheduled or as indicated in Design Selections.
- E. Specialty Coating for Steel (Non-Galvanized Hot-Rolled and Cold-Rolled Steel and Iron Installations): Prepare, treat, and coat non-galvanized ferrous metal with finish as indicated below.

1. Prepare uncoated ferrous-metal surfaces by thoroughly cleaning. The cleaned surfaces shall be free of rust, scale, grease, oil, paint or other foreign matter. The cleaning process shall be performed without measurable abrasion or erosion.
  2. Coating shall be applied after all fabricating, machining, forming, welding, cold forming or heat treatments have been completed.
  3. The process shall not result in any attack of the surface, no pitting or intergranular and shall not reduce the hardness or cause embrittlement of the steel.
  4. Finish: As scheduled or indicated in Design Selections.
- F. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply shop primer to prepared surfaces of items unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
1. Field-Applied Coatings: As specified in Division 09 Section "Painting".
  2. Field-Applied Coatings: As specified in Division 09 Section "High-Performance Coatings".

## **2.16 STAINLESS-STEEL FINISHES**

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
  1. Directional Finishes: Run grain of directional finishes with long dimension of each piece.
- C. Bright, Cold-Rolled, Unpolished Finish: No. 2B.
- D. Directional Satin Finish: No. 4.
- E. Dull Satin Finish: No. 6.
- F. Satin, Reflective, Directional Polish: No. 7.
- G. Mirrorlike Reflective, Nondirectional Polish: No. 8 finish.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  1. Respective manufacturer/fabricator's written installation instructions.

3. Accepted submittals.
4. Contract Documents.

- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

### **3.4 INSTALLATION, ORNAMENTAL METAL**

- A. Locate and place ornamental metal items level and plumb and in alignment with adjacent construction. Perform cutting, drilling, and fitting required to install ornamental formed metal.
1. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where needed to protect metal surfaces and to make a weathertight connection.
- C. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealants and joint fillers as indicated.
- D. Provide anchorage devices and fasteners where needed to secure ornamental metal to in-place construction.
- E. Perform cutting, drilling, and fitting required to install ornamental metal. Set products accurately in location, alignment, and elevation, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items to be built into concrete, masonry, or similar construction.
- F. Fit exposed connections accurately together to form tight, hairline joints or, where indicated, uniform reveals and spaces for sealants and joint fillers. Where cutting, welding, and grinding are required for proper shop fitting and jointing of ornamental metal, restore finishes to eliminate evidence of such corrective work.
- G. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.
- H. Install concealed gaskets, joint fillers, insulation, and flashings as work progresses.
- I. Restore protective coverings that have been damaged during shipment or installation. Remove protective coverings only when there is no possibility of damage from other work yet to be performed at same location.
1. Retain protective coverings intact; remove coverings simultaneously from similarly finished items to preclude non-uniform oxidation and discoloration.

- I. Field Welding: Comply with applicable AWS specification for procedures of manual shielded metal arc welding and requirements for welding and for finishing welded connections in "Fabrication, General" Article. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
- J. Field Brazing: Comply with requirements for brazing and for finishing brazed connections in "Fabrication, General" Article. Braze connections that are not to be left as exposed joints but cannot be shop brazed because of shipping size limitations.

### **3.5 ADJUSTING AND CLEANING**

- A. Unless otherwise indicated, clean metals by washing thoroughly with clean water and soap, rinsing with clean water, and drying with soft cloths.
- B. Copper Alloys: Clean copper alloys according to metal finisher's written instructions in a manner that leaves an undamaged and uniform finish matching approved Sample.
- C. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
  - 1. Apply by brush or spray to provide a minimum 2.0 mil (0.05 mm) dry film thickness.
- D. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 Section "Painting".
- E. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 Section "High-Performance Coatings".
- F. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.

### **3.6 PROTECTION**

- A. Protect finishes of ornamental formed metal items from damage during construction period. Remove temporary protective coverings at time of Substantial Completion.

### **3.7 FINISH SCHEDULE:** Reference Drawings.

## **END OF SECTION**

## **SECTION 05 7300**

### **ORNAMENTAL HANDRAILS AND RAILINGS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Work required for this section includes ornamental handrails and, railings along with supplementary items necessary to complete their installation.
- B. Related Section:
  - 1. Division 05 Section "Pipe and Tube Railings" for handrails and railings fabricated from steel pipe and tube components.

##### **1.2 DEFINITIONS**

- A. Railings: Guards, handrails, and similar devices used for protection of occupants at open-sided floor areas, pedestrian guidance and support, visual separation, or wall protection.
- B. Interior: Areas located in conditioned spaces.
- C. Exterior: Areas exposed to the elements and areas located in unconditioned spaces.

##### **1.3 DELEGATED ENGINEERING REQUIREMENTS**

- A. Contract Documents Design Intent: Drawings and Specifications indicate design intent for products and systems and do not necessarily indicate or specify total Work required. Contract Documents shall not be construed as an engineered design; furnish and install all Work required for a complete installation.
- B. Delegated Engineering Responsibility: Contractor shall employ a qualified professional engineer to provide engineering for products and systems including attachment to building structure required to meet design intent of Contract Documents.
  - 1. Preparation of structural analysis data including engineering calculations, shop drawings and other submittals signed and sealed by the qualified professional engineer.
- C. Delegated Engineering Professional Qualifications: Professional engineer legally authorized to practice in jurisdiction where Project is located and experienced in providing engineering services of kind indicated for products and systems similar to this Project and has a record of successful in-service performance.

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D. Coordination of Work:

1. Product Variations: In the event of minor differences between products and systems of acceptable or available manufacturers, Contractor shall notify Architect of such differences and resolve conflicts in a timely manner. Failure of Contractor to provide notification shall be construed as acceptance of conditions indicated, and changes caused by minor differences between products and Contract Documents shall be included in the Work at no additional cost to Owner.
2. Allowable Adjustments: Minor dimension and profile adjustments may be made in interest of fabrication or erection methods or techniques or ability to satisfy design intent, provided design intent is maintained as determined by Architect. Proposed deviations shall include a detailed analysis of impact to adjacent substrates or other building systems, including related design or construction cost impacts. If accepted by Architect, deviations causing changes in materials, constructability, substrates, or conditions shall be included in the Work at no additional cost to Owner.

**1.4 ACTION SUBMITTALS**

A. Product Data: Manufacturer's technical literature for each product and system indicated.

1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
2. Manufacturer's product lines of railings assembled from standard components.
3. Grout, anchoring cement, and paint products.

B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.

1. For illuminated railings, include wiring diagrams and roughing-in details.

C. Samples for Initial Selection: For products involving selection of color, texture, or design, including mechanical finishes.

D. Samples for Verification: For each type of exposed finish required.

1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
2. Each type of glass required.
3. Fittings and brackets.
4. Welded or brazed connections, as applicable.
5. Assembled Samples of railing systems, made from full-size components, including top rail, post, handrail, and infill. Show method of finishing members at intersections. Samples need not be full height.

## **1.5 INFORMATIONAL SUBMITTALS**

- A. Delegated Engineering Calculations: Informational submittal for products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation; test reports are not acceptable substitute for calculations.
- B. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
- C. Mill Certificates for Exterior Stainless Steel Railings: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.
- D. Welding certificates.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.
- F. Field Quality Control Reports: Written report of inspection required by "Field Quality Control".

## **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 10 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Installer Qualifications:
  - 1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  - 2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
- C. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including structural analysis, preconstruction testing, field testing, and in-service performance.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- D. Welding Qualifications: Qualify procedures and personnel according to the following:
1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
  2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
  3. AWS D1.6, "Structural Welding Code - Stainless Steel."
- E. Safety Glazing Labeling: Permanently mark glass with certification label of the Safety Glazing Certification Council (SGCC) or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- G. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.
1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.
    - a. Show typical components, attachments to building structure, and requirements of installation.
  2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
  3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
  4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
  5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

#### **1.7 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.
1. Participants:
    - a. Architect.

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- b. Contractor, including superintendent.
  - c. Installer, including project manager and supervisor.
  - d. If requested, Manufacturer's qualified technical representative.
  - e. Installers of other construction interfaced with Work.
- 2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
  - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
  - b. Review Contract Document requirements.
  - c. Review approved submittals.
  - d. Review inspection and testing requirements.
  - e. Review environmental conditions and procedures for coping with unfavorable conditions.
  - f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
- 3. Record discussions, including decisions and agreements, and prepare report.

## **1.8 PROJECT CONDITIONS**

- A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

## **1.9 COORDINATION AND SCHEDULING**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.
- B. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- C. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- D. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not suit structural performance requirements.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
- B. Available Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those listed.
  - 1. Aluminum Decorative Railings:
    - a. Blum, Julius & Co., Inc.
    - b. Blumcraft of Pittsburg.
    - c. CraneVeyor Corp.
    - d. Laurence, C.R. Co., Inc.
    - e. Livers Bronze Co.
    - f. Newman Brothers, Inc.
    - g. Sterling Dula Architectural Products, Inc. Div. of Kane Manufacturing.
    - h. Wagner, R & B, Ins.; a division of the Wagner Companies.
  - 2. Stainless Steel Decorative Railings:
    - a. Blum, Julius & Co., Inc.
    - b. Blumcraft of Pittsburg.
    - c. CraneVeyor Corp.
    - d. Livers Bronze Co.
    - e. Newman Brothers, Inc.
    - f. VIVA Railings.
    - g. Wagner, R & B, Ins.; a division of the Wagner Companies.
  - 3. Steel and Iron Decorative Railings:
    - a. Blum, Julius & Co., Inc.
    - b. Livers Bronze Co.
    - c. Wagner, R & B, Ins.; a division of the Wagner Companies.
  - 4. Glass Supported Railings:
    - a. Blum, Julius & Co., Inc.
    - b. Blumcraft of Pittsburg.
    - c. CraneVeyor Corp.

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- d. Livers Bronze Co.
- e. Newman Brothers, Inc.
- f. VIVA Railings.

- C. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

- 1. Selections: As scheduled or as indicated on Drawings.

## **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

## **2.3 PERFORMANCE REQUIREMENTS**

- A. Delegated Design: Design railings, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:

- 1. Aluminum: The lesser of minimum yield strength divided by 1.65 or minimum ultimate tensile strength divided by 1.95.
- 2. Copper Alloys: 60 percent of minimum yield strength.
- 3. Stainless Steel: 60 percent of minimum yield strength.
- 4. Steel: 72 percent of minimum yield strength.
- 5. Glass: 25 percent of mean modulus of rupture (50 percent probability of breakage), as listed in "Mechanical Properties" in AAMA's Aluminum Curtain Wall Series No. 12, "Structural Properties of Glass."

- C. Structural Performance: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

- 1. Handrails and Top Rails of Guards:
  - a. Uniform load of 50 lbf/ft. (0.73 kN/m) applied in any direction.
  - b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
  - c. Uniform and concentrated loads need not be assumed to act concurrently.
- 2. Infill of Guards:

- a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
  - b. Infill load and other loads need not be assumed to act concurrently.
- 3. Top Rail at Glass-Supported Railings: Support each section of top rail by a minimum of three glass panels or by other means so top rail will remain in place if any one panel fails.
- D. Thermal Movements for Exterior Railings: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
  - 1. Temperature Change: 120 deg F (49 deg C), ambient; 180 deg F (82 deg C), material surfaces.
- E. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

## **2.4 METALS, GENERAL**

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Same metal and finish as supported rails unless otherwise indicated.
  - 1. Provide either formed- or cast-metal brackets with predrilled hole for exposed bolt anchorage.

## **2.5 ALUMINUM**

- A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties for each aluminum form required not less than that of alloy and temper designated below.
- B. Extruded Bars and Shapes, Including Extruded Tubing: ASTM B 221 (ASTM B 221M), Alloy 6063-T5/T52.
- C. Extruded Structural Pipe and Round Tubing: ASTM B 429/B 429M, Alloy 6063-T6.
  - 1. Provide Standard Weight (Schedule 40) pipe unless otherwise indicated.
- D. Drawn Seamless Tubing: ASTM B 210 (ASTM B 210M), Alloy 6063-T832.

- E. Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 5005-H32 or Alloy 6061-T6 as required to meet specification and design performance requirements.
- F. Die and Hand Forgings: ASTM B 247 (ASTM B 247M), Alloy 6061-T6.
- G. Castings: ASTM B 26/B 26M, Alloy A356.0-T6.

## **2.6 STAINLESS STEEL**

- A. Railings:
  - 1. Tubing: ASTM A 554, Grade MT 304.
  - 2. Pipe: ASTM A 312/A 312M, Grade TP 304.
  - 3. Castings: ASTM A 743/A 743M, Grade CF 8 or CF 20.
  - 4. Sheet, Strip, Plate, and Flat Bar: ASTM A 666, Type 304.
  - 5. Bars and Shapes: ASTM A 276, Type 304.
- B. Railings:
  - 1. Tubing: ASTM A 554, Grade MT 316 or 316L.
  - 2. Pipe: ASTM A 312/A 312M, Grade TP 316 or 316L.
  - 3. Castings: ASTM A 743/A 743M, Grade CF 8M or CF 3M.
  - 4. Sheet, Strip, Plate, and Flat Bar: ASTM A 666, Type 316 or 316L.
  - 5. Bars and Shapes: ASTM A 276, Type 316 or 316L.

## **2.7 STEEL AND IRON**

- A. Tubing: ASTM A 500 (cold formed) or ASTM A 513.
- B. Bars: Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.
- C. Plates, Shapes, and Bars: ASTM A 36/A 36M.
- D. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

## **2.8 GLASS AND GLAZING MATERIALS**

- A. Laminated Glass: ASTM C 1172, Condition A (uncoated), Type I (transparent flat glass), Quality-Q3 with two plies of glass and cast-in-place and cured-transparent-resin interlayer to comply with interlayer manufacturer's written recommendations needed to comply with requirements.
  - 1. Basis-of-Design Product: <Insert manufacturer's name and product.>
  - 2. Kind: LT (laminated tempered).

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3. Glass Color: Clear.
  4. Interlayer Basis of Design: DuPont; SentryGlas Ionoplast; clear, thickness as required for intended use.
  5. Glass Plies: 1/4 in (6 mm) thick, each ply; unless otherwise required to meet design load.
- B. Glazing Cement and Accessories for Structural Glazing: Glazing cement, setting blocks, shims, and related accessories as recommended or supplied by railing manufacturer for installing structural glazing in metal subrails.
1. Glazing Cement: Non-shrinking organic cement designed for curing by passing an electric current through metal subrail holding glass panel, as standard with manufacturer.
- C. Glazing Gaskets for Glass Infill Panels: Glazing gaskets and related accessories recommended or supplied by railing manufacturer for installing glass infill panels in post-supported railings.

## **2.9 FASTENERS**

- A. Fastener Materials: Unless otherwise indicated, provide the following:
1. Aluminum Components for Interior Railings: Type 304 stainless-steel fasteners.
  2. Aluminum Components for Exterior Railings: Type 316 stainless-steel fasteners.
  3. Copper-Alloy (Bronze) Components: Silicon bronze (Alloy 651 or Alloy 655) fasteners where concealed; muntz metal (Alloy 280) fasteners where exposed.
  4. Copper-Alloy (Brass) Components: Silicon bronze (Alloy 651 or Alloy 655) fasteners where concealed; brass (Alloy 260 or Alloy 360) fasteners where exposed.
  5. Stainless-Steel Components: Type 304 stainless-steel fasteners.
  6. Stainless-Steel Components: Type 316 stainless-steel fasteners.
  7. Uncoated Steel Components: Plated-steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating where concealed; Type 304 stainless-steel fasteners where exposed.
  8. Galvanized-Steel Components: Plated-steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.
  9. Dissimilar Metals for Interior Railings: Type 304 stainless-steel fasteners.
  10. Dissimilar Metals for Exterior Railings: Type 316 stainless-steel fasteners.
- B. Fasteners for Anchoring to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.
- C. Provide concealed fasteners for interconnecting railing components and for attaching railings to other work unless exposed fasteners are unavoidable.
1. Provide Phillips flat-head machine screws for exposed fasteners unless otherwise indicated.

- D. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- E. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
  - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.
  - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 2 (A4) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

## **2.10 MISCELLANEOUS MATERIALS**

- A. Wood Rails: Hardwood rails complying with Division 06 Section "Interior Architectural Woodwork."
- B. Electrical Components for Illuminated Railings: Provide internal, fluorescent light fixtures and electrical components, required as part of illuminated railings, that comply with NFPA 70 and that are listed and labeled by UL.
- C. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
  - 1. Aluminum Railings: For aluminum railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- D. Brazing Rods for Copper-Alloy Railings: For copper-alloy railings, provide type and alloy as recommended by producer of metal to be brazed and as required for color match, strength, and compatibility in fabricated items.
- E. Lacquer for Copper Alloys: Clear acrylic lacquer specially developed for coating copper-alloy products.
- F. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
- G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- H. Non-shrink, Non-metallic Grout: Factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

## **2.11 FABRICATION**

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. Make up wire-rope assemblies in the shop to field-measured dimensions with fittings machine swaged. Minimize amount of turnbuckle take-up used for dimensional adjustment so maximum amount is available for tensioning wire ropes. Tag wire-rope assemblies and fittings to identify installation locations and orientations for coordinated installation.
- D. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 in (0.8 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- E. Form work true to line and level with accurate angles and surfaces.
- F. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate. Locate weep holes in inconspicuous locations.
- G. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- H. Connections: Fabricate railings with welded or Non-welded connections unless otherwise indicated.
- I. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove flux immediately.
  - 4. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.
- J. Brazed Connections for Copper-Alloy Railings: Connect copper-alloy railings by brazing. Cope components at connections to provide close fit, or use fittings designed for this purpose. Braze corners and seams continuously.

1. Use materials and methods that match color of base metal, minimize distortion, and develop maximum strength and corrosion resistance.
  2. Remove flux immediately.
  3. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and brazed surface matches contours of adjoining surfaces.
- K. Mechanical Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
- L. Form changes in direction by flush bends or by inserting prefabricated flush-elbow fittings. Where applicable, by radius bends of radius indicated or by inserting prefabricated elbow fittings of radius indicated.
- M. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- N. Close exposed ends of hollow railing members with prefabricated end fittings.
- O. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns, unless clearance between end of rail and wall is 1/4 in (6 mm) or less.
- P. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
1. Interior Installations at Plaster or Gypsum Board Partitions: At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers, or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
- Q. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.
- R. For railing posts set in concrete, provide steel sleeves not less than 6 in (150 mm) long with inside dimensions not less than 1/2 in (12 mm) greater than outside dimensions of post, with metal plate forming bottom closure.
- S. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

## **2.12 GLAZING PANEL FABRICATION**

- A. General: Fabricate to sizes and shapes required; provide for proper edge clearance and bite on glazing panels.
  - 1. Clean-cut or flat-grind edges at butt-glazed sealant joints to produce square edges with slight chamfers at junctions of edges and faces
  - 2. Grind smooth exposed edges, including those at open joints, to produce square edges with slight chamfers at junctions of edges and faces.
- B. Structural Glass Balusters: Factory-bond glass to aluminum base and top-rail channels in railing manufacturer's plant using glazing cement to comply with manufacturer's written specifications, unless field glazing is standard with manufacturer.
- C. Structural Balusters: Provide laminated, tempered glass panels for both straight and curved sections.
- D. Infill Panels: Provide laminated, tempered glass panels for both straight and curved sections.

## **2.13 GENERAL FINISH REQUIREMENTS**

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

## **2.14 ALUMINUM FINISHES**

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Mechanical Finish: AA-M3x (Mechanical Finish: as specified); sand top rails, handrails, and intermediate rails in one direction only, parallel to length of railing, with 120- and 320-grit abrasive. After installation, polish railings with No. 0 steel wool immersed in paste wax, then rub to a luster with a soft dry cloth.

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- C. Clear Anodic Finish at Interior Installations: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.
- D. Clear Anodic Finish at Exterior Installations: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
- E. Color Anodic Finish at Interior Installations: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.
  - 1. Color: As scheduled or as indicated in Design Selections.
- F. Color Anodic Finish at Exterior Installations: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
  - 1. Color: As scheduled or as indicated in Design Selections
- G. High-Performance Organic Finish: High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions. Provide dry film thickness, primers, color coats and clear coats required to comply with performance requirements and warranty periods indicated.
  - 1. PVDF Fluoropolymer Finish: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat.
  - 2. FEVE Fluoropolymer Finish: Fluoropolymer finish complying with AAMA 2605 and containing 100 percent fluorinated ethylene vinyl ether (FEVE) resin in color coat.
  - 3. Color and Gloss: As scheduled or as indicated in Design Selections.
- H. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
  - 1. Color and Gloss: As scheduled or as indicated in Design Selections.
- I. Siliconized Polyester Finish: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil (0.005 mm) for primer and 0.8 mil (0.02 mm) for topcoat.
  - 1. Color and Gloss: As scheduled or as indicated in Design Selections.

## **2.15 STAINLESS-STEEL FINISHES**

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. Directional Finishes: Run grain of directional finishes with long dimension of each piece.
- C. Directional Satin Finish: No. 4.
- D. Dull Satin Finish: No. 6.
- E. Satin, Reflective, Directional Polish: No. 7.
- F. Mirrorlike Reflective, Non-directional Polish: No. 8.
- G. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
- H. Sputter-Coated Finish: Titanium nitride coating deposited by magnetic sputter-coating process over indicated mechanical finish.
- I. Finish: Match Architect's sample.
- J. Finish: As scheduled or as indicated in Design Selections.

## **2.16 STEEL AND IRON FINISHES**

- A. Galvanized Railings for Exterior Installations:
  1. General:
    - a. Hot-dip galvanize steel and iron railings, including hardware, after fabrication.
    - b. Comply with ASTM A 123/A 123M for hot-dip galvanized railings.
    - c. Comply with ASTM A 153/A 153M for hot-dip galvanized hardware.
    - d. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
    - e. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
  2. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.
- B. Non-Galvanized Railings for Interior Installations:
  1. For non-galvanized-steel railings, provide Non-galvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry.

- C. Powder-Coat Finish for Non-Galvanized Steel and Iron Installations: Prepare, treat, and coat non-galvanized ferrous metal to comply with resin manufacturer's written instructions and as follows:
  - 1. Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  - 2. Treat prepared metal with iron-phosphate pretreatment, rinse, and seal surfaces.
  - 3. Apply thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than 1.5 mils (0.04 mm).
  - 4. Color and Gloss: As scheduled or as indicated in Design Selections.
  
- D. Powder-Coat Finish for Galvanized Steel and Iron Installations: Prepare, treat, and coat galvanized metal to comply with resin manufacturer's written instructions and as follows:
  - 1. Prepare galvanized metal by thoroughly removing grease, dirt, oil, flux, and other foreign matter.
  - 2. Treat prepared metal with zinc-phosphate pretreatment, rinse, and seal surfaces.
  - 3. Apply thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than 1.5 mils (0.04 mm).
  - 4. Color and Gloss: As scheduled or as indicated in Design Selections .
  
- E. High-Performance Coating for Non-Galvanized Steel and Iron Installations: Apply epoxy intermediate and polyurethane topcoats to prime-coated surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Apply at spreading rates recommended by coating manufacturer.
  - 1. Color and Gloss: As scheduled or as indicated in Design Selections.
  
- F. Preparing Non-galvanized Items for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with requirements indicated below:
  - 1. Exterior Railings: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning".
  - 2. Interior Railings: SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning".
  
- G. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
  - 1. Shop prime uncoated railings with primers specified in Division 09 Section "Painting".
  - 2. Shop prime uncoated railings with primer specified in Division 09 Section "High-Performance Coatings"□.
  - 3. Do not apply primer to galvanized surfaces.
  
- H. Field-Painted Finish: Comply with Division 09 Section "Painting".

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1. Color and Gloss: As scheduled or as indicated in Design Selections.
- I. Field-Painted Coatings: Comply with Division 09 Section "High-Performance Coatings".
  1. Color and Gloss: As scheduled or as indicated in Design Selections.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.
- B. Interior Installations: Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

#### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  1. Respective manufacturer/fabricator's written installation instructions.
  2. Accepted submittals.
  3. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

#### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

#### **3.4 INSTALLATION**

- A. Fit exposed connections together to form tight, hairline joints.

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- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
  - 1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
  - 2. Set posts plumb within a tolerance of 1/16 in in 3 feet (1.5 mm in 1 m).
  - 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 in in 12 feet (6 mm in 3.6 m).
- C. Corrosion Protection for Aluminum or Copper Alloys: Coat concealed surfaces of aluminum or copper alloys that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- D. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

### **3.5 RAILING CONNECTIONS**

- A. Non-welded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.
- B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.
- C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 in (50 mm) beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 in (150 mm) of post.

### **3.6 ANCHORING POSTS**

- A. Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with non-shrink, non-metallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Cover anchorage joint with flange of same metal as post, attached to post with set screws.

- C. Anchor posts to metal surfaces with flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
  - 1. Aluminum Railings: For aluminum railings, attach posts as indicated using fittings designed and engineered for this purpose.
  - 2. Copper-Alloy Railings: For copper-alloy railings, attach posts as indicated using fittings designed and engineered for this purpose.
  - 3. Stainless Steel Railings: For stainless-steel railings, weld flanges to posts and bolt to metal-supporting surfaces.
  - 4. Steel Railings: For steel railings, weld flanges to posts and bolt to metal-supporting surfaces.

### **3.7 ATTACHING RAILINGS**

- A. Anchor railing ends to concrete and masonry with flanges connected to railing ends and anchored to wall construction with anchors and bolts.
- B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and welded to railing ends or connected to railing ends using non-welded connections.
- C. Attach handrails to walls with wall brackets except where end flanges are used. Provide brackets with 1-1/2 in (38 mm) clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
  - 1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
  - 2. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- D. Secure wall brackets and railing end flanges to building construction as follows:
  - 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
  - 2. For hollow masonry anchorage, use toggle bolts.
  - 3. For steel-framed partitions, fasten brackets directly to steel framing or concealed steel reinforcements using self-tapping screws of size and type required to support structural loads.

### **3.8 INSTALLING GLASS PANELS**

- A. Glass-Supported Railings: Install assembly to comply with railing manufacturer's written instructions.
  - 1. Attach base channel to building structure, then insert and connect factory-fabricated and -assembled glass panels if glass was bonded to base and top rail channels in factory.

2. Attach base channel to building structure, then insert glass into base channel and bond with glazing cement unless glass was bonded to base and top rail channels in factory.
    - a. Support glass panels in base channel at quarter points with channel-shaped setting blocks that also act as shims to maintain uniform space for glazing cement. Fill remaining space in base channel with glazing cement for uniform support of glass.
  3. Adjust spacing of glass panels so gaps between panels are equal before securing in position.
  4. Erect glass railings under direct supervision of manufacturer's authorized technical personnel.
- B. Post-Supported Glass Railings: Install assembly to comply with railing manufacturer's written instructions and with requirements in other Part 3 articles. Erect posts and other metal railing components, then set factory-cut glass panels. Do not cut, drill, or alter glass panels in field. Protect edges from damage.

### **3.9 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.
1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.

### **3.10 CLEANING**

- A. Clean aluminum and stainless steel by washing thoroughly with clean water and soap, rinsing with clean water, and wiping dry.
- B. Clean copper alloys according to metal finisher's written instructions in a manner that leaves an undamaged and uniform finish matching approved Sample.
- C. Clean and polish glass as recommended in writing by manufacturer. Wash both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion.
- D. Clean wood rails by wiping with a damp cloth and then wiping dry.

### **3.11 PROTECTION**

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

### **3.12 FINISH SCHEDULE:** Reference drawings.

**END OF SECTION**

## **SECTION 06 1053**

### **MISCELLANEOUS ROUGH CARPENTRY**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Miscellaneous rough carpentry and supplementary items necessary for installation.
  - 1. Section also includes composite plastic lumber materials.

##### **1.2 DEFINITIONS**

- A. Dimension Lumber: Lumber of 2 in nominal (38 mm actual) or greater, but less than 5 in nominal (114 mm actual) in least dimension.
- B. Lumber Grading Agencies:
  - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
  - 2. NHLA: National Hardwood Lumber Association.
  - 3. NLGA: National Lumber Grades Authority.
  - 4. SPIB: The Southern Pine Inspection Bureau.
  - 5. WCLIB: West Coast Lumber Inspection Bureau.
  - 6. WWPAA: Western Wood Products Association.

##### **1.3 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
  - 2. Preservative-Treated Wood: Include data for wood preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
  - 3. Fire-Retardant-Treated Wood: Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials, both before and after exposure to elevated temperatures when tested according to ASTM D 5664.
  - 4. Waterborne-Treated Wood: For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
  - 5. Warranties: Include copies from chemical treatment manufacturers for each type of treatment.

#### **1.4 INFORMATIONAL SUBMITTALS**

- A. Building Code Evaluation Reports: Published reports from model code organization, acceptable to authorities having jurisdiction, that following evidences compliance with building code in effect for the Project.
  - 1. Preservative-treated wood.
  - 2. Fire-retardant-treated wood.
- B. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.

#### **1.5 QUALITY ASSURANCE**

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

#### **1.6 DELIVERY, STORAGE, AND HANDLING**

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

#### **1.7 PROJECT CONDITIONS**

- A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

#### **1.8 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

### **PART 2 - PRODUCTS**

#### **2.1 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

#### **2.2 PERFORMANCE REQUIREMENTS**

- A. General Performance: Engineer products and systems to withstand loads within limits of allowable working stresses of the materials involved under conditions indicated and without permanent deformation or failure of materials.

- B. Miscellaneous Rough Carpentry within Roofing System Assemblies: Wood cants, nailers, curbs, equipment support bases, blocking, and similar members in connection with roofing system assembly and flashings shall be fabricated and installed to withstand specified uplift pressures and thermally induced movement without contributing to failure of roofing system or flashings.
- C. Surface Burning Characteristics for Fire-Retardant-Treated Wood: Products and construction identical to assemblies tested for fire resistance according to ASTM E 84/NFPA 255/UL 723 and included under Category BPVV published in Underwriters Laboratories, Inc. (UL) "Fire Resistance Directory"; or listing of another testing and inspecting agency acceptable to authorities having jurisdiction.
  - 1. Flame Spread: Class A - no greater than 25.
  - 2. Smoke Developed: No greater than 450.

## 2.3 WOOD PRODUCTS

- A. Dimension Lumber:
  - 1. Material Quality Standards: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with applicable rules of any rules-writing agency certified by ALSC Board of Review. Provide lumber graded by an agency certified by ALSC Board of Review to inspect and grade lumber under rules indicated.
  - 2. Grade: Provide No. 2 grade, of any of following species:
    - a. Hem-fir (north); NLGA.
    - b. Hem-fir; WCLIB, or WWPA.
    - c. Mixed southern pine; SPIB.
    - d. Spruce-pine-fir; NLGA.
    - e. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
    - f. Douglas fir-larch; WCLIB or WWPA.
    - g. Douglas fir-larch (north); NLGA.
    - h. Douglas fir-south; WWPA.
    - i. Northern species; NLGA.
    - j. Eastern softwoods; NeLMA.
    - k. Western woods; WCLIB or WWPA.
  - 3. Grade Marking: Factory mark each piece of lumber with grade stamp of grading agency.
  - 4. Sizes: Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
  - 5. Finish: Provide dressed lumber, sanded four sides, unless otherwise indicated.
  - 6. Maximum Moisture Content:
    - a. Provide kiln-dry lumber with 19 percent maximum moisture content at time of dressing for 2 in nominal (38 mm actual) thickness or less, for concealed conditions.
    - b. Provide kiln-dry lumber with 15 percent maximum moisture content at time of dressing for 2 in nominal (38 mm actual) thickness or less, for exposed conditions.
- B. Plywood:

1. Material Quality Standard: DOC PS 1, Exposure 1.
2. Grades: Furnish the grades below according to installation location:
  - a. A-C; when exposed at occupied interior locations.
  - b. B-C; when exposed at mechanical and electrical equipment rooms.
3. Grade Marking: Factory mark each piece of plywood with grade stamp of grading agency.
4. Thickness: Not less than 1/2 in (12 mm), unless indicated otherwise.

## **2.4 TREATED WOOD PRODUCTS**

### **A. Preservative-Treated Wood:**

1. Product Quality Standard: AWWA, Use Category UC4a, for species, product, preservative, and end use. Use preservative treatment that does not promote corrosion of metal fasteners.
2. Description: Wood products impregnated with chemicals by pressure process acceptable to authorities having jurisdiction, according to the following:
  - a. Listed in Section 4 of AWWA U1.
  - b. Containing no arsenic or chromium.
3. Field Preservative-Treatment for Cut Surfaces: Apply one of the following depending upon conditions listed below, in accordance with AWWA M4:
  - a. Continuously Protected from Liquid Water: Inorganic boron.
  - b. Not Continuously Protected from Liquid Water: Copper naphthenate.

### **B. Fire-Retardant-Treated Wood:**

1. Product Quality Standards: Provide materials that comply with performance requirements in AWWA C20 (lumber) and AWWA C27 (plywood). Identify fire-retardant-treated wood with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction. Use fire-retardant treatment that does not promote corrosion of metal fasteners.
  - a. Concealed Wood Blocking: Chemical formulations for fire retardant treatment to contain a compatible, non-bleed, light fast, colored dye to identify and indicate treatment.
2. Description: Wood products impregnated with chemicals by pressure process, or other means acceptable to authorities having jurisdiction, having following characteristics:
  - a. Fire-retardant-treated materials shall comply with performance requirements specified above after being subjected to accelerated weathering according to ASTM D 2898.
  - b. Use treatment for which chemical manufacturer publishes physical properties of treated wood after exposure to elevated temperatures, when tested by a qualified independent testing agency according to ASTM D 5664, for lumber and ASTM D 5516, for plywood.
  - c. Use Interior Type A High Temperature (HT), unless otherwise indicated.

- C. Moisture Content: Kiln-dry wood after treatment to following maximum moisture content:
  - 1. 19 percent for lumber.
  - 2. 15 percent for plywood.
- D. Quality Marking: Identify with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

## **2.5 FASTENERS**

- A. Fastener Types and Materials: Select fasteners for type, grade, and class required. Unless otherwise indicated, furnish Type 304 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 / F 1941M, Class Fe/Zn 5, within roofing system assemblies.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: ICC-ES NER-272.
- D. Powder-Actuated Fasteners: ANSI A10.3; low velocity, powder-actuated fasteners; drive pins and washers fabricated from corrosion-resistant materials; powder loads suitable for application indicated; and capable of sustaining, without failure, an ultimate load capacity not less than 10 times that imposed by construction as determined by testing according to ASTM E 1190 by a qualified independent testing agency.
- E. Wood Screws: ASME B18.6.1, flat head, carbon steel.
- F. Screws for Fastening to Metal Framing: As specified in the following locations.
  - 1. Division 05 Section "Cold-Formed Steel Framing".
  - 2. Division 09 Section "Gypsum Board Assemblies".
- G. Lag Bolts: ASME B18.2.1/ASME B18.2.3.8M.
- H. Bolts: Steel bolts complying with ASTM A 307, Grade A / ASTM F 568M, Property Class 4.6; with ASTM A 563 / ASTM A 563M hex nuts and, where indicated, flat washers.

## **2.6 ANCHORS**

- A. Anchors: Capable of sustaining, without failure, a load equal to 6 times load imposed when installed in unit masonry and 4 times load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- B. Cast-in-Place Anchors in Concrete: Bolts, washers, and shims as needed, either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47 / A 47M malleable iron or ASTM A 27 / A 27M cast steel; hot-dip galvanized according to ASTM F 2329.
- C. Post-Installed Anchors:
  - 1. Generic Type: Torque-controlled expansion anchors.
  - 2. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 / F 1941M, Class Fe/Zn 5, unless otherwise indicated.

3. Material for Exterior Locations and where Stainless Steel is indicated: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4).

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products, fabrications, and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  1. Respective manufacturer written installation instructions.
  2. Accepted submittals.
  3. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.
- C. General Requirements:
  1. Securely attach Work to substrate according to authorities having jurisdiction.
  2. Select fasteners of appropriate size, type, and length that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Predrill members when necessary to avoid splitting wood while installing fasteners. Do not countersink nail heads, unless otherwise indicated. Recess bolts and nuts flush with surfaces, unless otherwise indicated.
  3. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber.
  4. Do not use material with the following conditions:
    - a. Material that is warped or does not comply with requirements for untreated material.
    - b. Materials with defects that interfere with function of member.
    - c. Pieces which are too small to use with minimum number of joints or optimum joint arrangement.
  5. Set carpentry to required levels and lines, with members plumb, true to line, and level. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
  6. Apply field preservative-treatment to cut surfaces of preservative-treated wood.
  7. Where preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

D. Schedule of Applications:

1. Preservative-Treated Wood: Use preservative-treated wood for the following applications.
  - a. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing systems.
  - b. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
  - c. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
2. Fire-Retardant-Treated Wood: Use fire-retardant-treated wood for the following applications:
  - a. Concealed wood blocking within interior partitions.
  - b. Exposed plywood backing panels supporting equipment at interior locations.
3. Untreated Wood: Not allowed.

**3.3 WOOD BLOCKING AND NAILER INSTALLATION**

- A. Install where indicated and where required for attaching other work. Coordinate locations with other work involved.
- B. Securely attach items to substrates to support applied loading.

**3.4 PLYWOOD INSTALLATION**

- A. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels.
- B. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.

**3.5 PROTECTION**

- A. General: Protect untreated wood, and wood that has been treated with chemicals that can leach, from deterioration due to weather.

**END OF SECTION**

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MISCELLANEOUSE ROUGH CARPENTRY

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## **SECTION 06 1643**

### **EXTERIOR GYPSUM SHEATHING**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Exterior gypsum sheathing products and supplementary items necessary for installation.
- B. Related Section:
  - 1. Refer to Division 7 section for applicable Air and Water Barrier system and related requirements. Ensure compatibility of joint treatment components with Air and Water Barrier system.

##### **1.2 DEFINITIONS**

- A. Gypsum Board Construction Terminology: Refer to ASTM C 11 for definitions of terms not defined in this Section or in other referenced quality standards.

##### **1.3 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.

##### **1.4 INFORMATIONAL SUBMITTALS**

- A. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
- B. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".
- C. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.
- D. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
- E. Warranty: Sample of warranty.
  - 1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations, and exclusions.

## **1.5 QUALITY ASSURANCE**

### **A. Installer Qualifications:**

1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.

## **1.6 PRE-INSTALLATION CONFERENCE**

### **A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.**

#### **1. Participants:**

- a. Architect.
- b. Contractor, including superintendent.
- c. Installer, including project manager and supervisor.
- d. If requested, Manufacturer's qualified technical representative.
- e. Installers of other construction interfaced with Work.

#### **2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:**

- a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
- b. Review Contract Document requirements.
- c. Review approved submittals.
- d. Review inspection and testing requirements.
- e. Review environmental conditions and procedures for coping with unfavorable conditions.
- f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.

#### **3. Record discussions, including decisions and agreements, and prepare report.**

## **1.7 DELIVERY, STORAGE, AND HANDLING**

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

## **1.8 PROJECT CONDITIONS**

- ### **A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.**
- ### **B. Exposure Limitation: Exterior gypsum sheathing shall not be exposed to weather for more than 180 days.**

## **1.9 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.
  - 1. Ensure compatibility of joint treatment components with Air and Water Barrier systems incorporated into project.

## **1.10 WARRANTY**

- A. Manufacturer's Warranty: Furnish manufacturer's written material and labor warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design and installation of product. "Defects" is defined to include but not limited to deterioration or failure to perform as required.
  - 1. Warranty Period: Manufacturer shall warrant the products to be free from material and labor defects for a period of 5 years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures.
- B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other available manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

### **2.2 MATERIALS**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.
- B. Exterior Gypsum Sheathing Boards:
  - 1. Generic Type: Glass-mat faced exterior gypsum sheathing board.
  - 2. Material Quality Standard: ASTM C 1177 / C 1177M, Type X.
  - 3. Description: Paperless, treated, water resistant, noncombustible, gypsum core with inorganic glass mat partially or completely embedded on both faces; acrylic coated on one face; 5/8 in (15 mm) thick. Provide in maximum lengths and widths available that will minimize short-edge-to-short-edge butt joints and to correspond to support system indicated.
  - 4. Manufacturers and Products:
    - a. CertainTeed Corporation; GlasRoc Sheathing, Type X.
    - b. Georgia-Pacific Gypsum LLC; DensGlass Gold Fireguard Type X Sheathing.

- c. National Gypsum Company; Gold Bond Brand eXP Fire-Shield Extended Exposure Sheathing.
- d. United States Gypsum Company (USG); Securock Firecode Type X Glass-Mat Sheathing.

C. Vertical Cover Boards (Back of Parapet):

- 1. Generic Type: Glass-mat faced exterior gypsum sheathing board specifically manufactured for use beneath roofing systems.
- 2. Material Quality Standard: ASTM C 1177 / C 1177M, Type X.
- 3. Description: Non-combustible moisture-resistant gypsum core with glass-mat facings and a non-asphaltic coating on one face; 5/8 in (15 mm) thick. Provide in maximum lengths and widths available that will minimize short-edge-to-short-edge butt joints and to correspond to support system indicated.
- 4. Manufacturers and Products:
  - a. Georgia-Pacific Gypsum LLC; DensDeck Prime.
  - b. USG; SECUROCK Gypsum-Fiber Roof Board.

D. Horizontal Roof Cover Boards: As specified in Division 07 Section for roofing membrane.

E. Screw Fasteners:

- 1. Material Quality Standards:
  - a. Metal Framing Members less than 0.030 in (0.75 mm) Thick: ASTM C 1002, Type S.
  - b. Metal Framing Members from 0.033 in to 0.112 in (0.79 mm to 2.9 mm) Thick: ASTM C 954, Type S-12.
- 2. Product Description - Standard Applications: Bugle head, self-drilling, self-tapping, steel screws with Phillips-head recess of size, holding power, and other properties recommended by manufacturer; minimum 1 in (25 mm) long; with corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
- 3. Limitation: Nails and staples are not permitted.

F. Joint Treatment Materials:

- 1. General: Joint treatment materials shall be acceptable to board manufacturer and air and water barrier system manufacturer for use in sealing joints, and with a history of successful in-service use
- 2. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches (50 mm) wide, 10 by 10 or 10 by 20 threads/inch (390 by 390 or 390 by 780 threads/m), of type recommended by sheathing and tape manufacturers in sealing joints in glass-mat gypsum sheathing.
- 3. Air Barrier Membrane Mastic:
  - a. Description: Single component, liquid-applied, non-asphaltic, vapor permeable rubberized (elastomeric) membrane which cures to a seamless monolithic rubber-like membrane to resist air leakage.
  - b. Water Vapor Permeance: 25 perms per ASTM E 96, Procedure B.
  - c. Basis of Design: Confirm compatibility of Air and Water Barrier system.
    - 1) Henry Company; Air-Bloc 31 Liquid Emulsion Vapor Permeable Air Barrier Membrane.

- 2) Dupont; Tyvek Fluid Applied Flashing and Joint Compound.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

#### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standard: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
1. GA-253.
  2. ASTM C 1280.
  3. Respective manufacturer's written installation instructions.
  4. Accepted submittals.
  5. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

#### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

#### **3.4 INSTALLATION**

- A. Installation of Exterior Gypsum Sheathing Boards[ and Back of Parapet Boards].
1. Install boards with coated face out, with panel lengths oriented vertically or horizontally as recommended by manufacturer, with vertical edges centered over flanges of studs, with edges and ends fitted tightly together.
  2. Do not install imperfect, damaged, wet, or damp boards.
  3. Cut boards at penetrations, edges, and other obstructions of the Work; fit tightly against abutting construction, except provide maximum 3/8 in (10 mm) setback where boards abut structural elements or materials that may retain moisture.
  4. Coordinate installation of boards with flashing and joint treatment so materials are installed in the sequence and manner that prevent exterior moisture from passing through completed exterior wall assembly.
  5. Install screws at perimeter and within field to each stud approximately 8 in (200 mm) on centers; set back minimum 3/8 in (10 mm) from edges and ends; apply so screw heads bear tightly against board face but do not cut into facing.
  6. Do not bridge building expansion joints with boards; cut and space edges to match spacing of structural support elements.

- B. Joint Treatment Installation at Exterior Gypsum Sheathing Boards[ and Back of Parapet Boards]:
  - 1. Coordinate installation with applicable Air and Water Barrier system to ensure compatibility of joint treatment.
  - 2. Apply glass-fiber mesh tape to joints between boards.
  - 3. Trowel apply air barrier membrane mastic over the top of glass-fiber mesh tape and at penetrations, openings, and edges where boards terminate at walls, floors, columns, or other structural elements.

### **3.5 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.
  - 1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.

### **3.6 PROTECTION**

- A. Procedures: Protect products and systems from damage during installation and remainder of construction period according to manufacturer's instructions. Remove and replace products that are exposed to weather for more than number of days allowed by manufacturer.

**END OF SECTION**

## **SECTION 06 4023**

### **INTERIOR ARCHITECTURAL WOODWORK**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Shop-finished interior architectural woodwork and supplementary items necessary for installation.
- B. Simulated Stone Countertops: Refer to Division 12 Section "Simulated Stone Countertops" for solid surfacing, quartz agglomerate, or cultured marble countertops incorporated into work specified in this Section. Simulated stone trim is specified in this Section.

##### **1.2 DEFINITIONS**

- A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.
- B. Stair Work and Rails: Rough carriages for stairs are a part of interior architectural woodwork. Platform framing, headers, partition framing, and other rough framing associated with stairwork are specified in Division 06 Section "Miscellaneous Rough Carpentry".
- C. Exposed Surfaces, Semi-Exposed Surfaces, Concealed Surfaces, Types of Cabinet Construction, and other related terms are defined in referenced quality standards.

##### **1.3 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
  - 2. Wood Veneered Items: Include finishing materials and processes.
  - 3. Fire Retardant Treated Wood: Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.
  - 1. Show details full size.
  - 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
  - 3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, and other items installed in architectural woodwork.

4. Wood Paneling with Transparent Finish: For paneling noted or schedule to be blueprint matched work, show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.
- C. Samples for Initial Selection: For each type of product for which a color has not yet been specified, provide manufacturer's color charts consisting of units or sections of units showing the full range of colors available.
- D. Samples for Verification:
1. Items with Transparent Finish:
    - a. Lumber with or for transparent finish, not less than 50 sq. in. (300 sq. cm) or 5 in (125 mm) wide by 24 in (600 mm) long, for each species and cut, finished on 1 side and 1 edge.
    - b. Veneer leaves representative of and selected from flitches to be used for transparent-finished woodwork.
    - c. Veneer-faced panel products with or for transparent finish, 8 in by 10 in (200 mm by 250 mm), for each species and cut. Include at least one face-veneer seam and finish as specified.
  2. Items with Opaque Finish:
    - a. Lumber and panel products with shop-applied opaque finish, 50 sq. in. (300 sq. cm) for lumber and 8 in by 10 in (200 mm by 250 mm) for panels, for each finish system and color, with 1/2 of exposed surface finished.
  3. Items with Plastic Laminate Finish:
    - a. Plastic laminates, 8 in by 10 in (200 mm by 250 mm), for each type, color, pattern, and surface finish, with 1 sample applied to core material and specified edge material applied to 1 edge.
  4. Simulated Stone Trim: 6 in (150 mm) long.
  5. Cabinets:
    - a. Corner Piece: Cabinet-front frame joints between stiles and rails, as well as exposed end pieces, 18 in (450 mm) high by 18 in (450 mm) wide by 6 in (150 mm) deep.
    - b. Cabinet Hardware and Accessories: Exposed cabinet hardware and accessories, one unit for each type and finish.
    - c. Countertops: Section of countertop showing top, front edge, and backsplash construction.
  6. Standing and Running Trim: Corner piece showing miter joints.

#### **1.4 INFORMATIONAL SUBMITTALS**

- A. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.

1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
- B. Installer Qualifications:
1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
  3. Certification: Certified participant in AWI's Quality Certification Program or licensee of WI's Certified Compliance Program.
- C. Source Limitations for Wood Veneered Items: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork with sequence-matched wood veneers and wood doors with face veneers that are sequence matched with woodwork.
- D. Quality Standard: Unless otherwise indicated, comply with "Architectural Woodwork Standards" for standards and for grades of interior architectural woodwork indicated for construction, finish, installation and other requirements:
1. Provide manufacturer certification indicating that woodwork complies with requirements of referenced quality standards.
  2. Provide AWI Quality Certification Program labels and certificates indicating that woodwork, including installation, complies with requirements of grades specified.
  3. Provide WI-certified compliance labels and certificates indicating that woodwork, including installation, complies with requirements of grades specified.
  4. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with such selections and requirements in addition to the quality standard.
- E. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated or required, provide materials and products with specified fire-test-response characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.
- F. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.
1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.
    - a. Show typical components, attachments to building structure, and requirements of installation.
  2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.

3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

G. Mock-ups, Cabinets:

1. One full-size sample of finished base cabinet unit complete with hardware, doors, and drawers, but exclusive of countertop.
2. One full-size sample of finished wall-mounted cabinet unit complete with hardware, doors, and adjustable shelves.
3. Accepted sample units will be used as a standard for judging the completed work. Unless otherwise directed, accepted sample units may be incorporated in work. If not incorporated in work, retain accepted sample units at Project site until completion of work and remove sample units from premises when directed by Architect.

## 1.5 PRE-INSTALLATION CONFERENCE

A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

1. Participants:
  - a. Architect.
  - b. Contractor, including superintendent.
  - c. Installer, including project manager and supervisor.
  - d. If requested, Manufacturer's qualified technical representative.
  - e. Installers of other construction interfaced with Work.
2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
  - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
  - b. Review Contract Document requirements.
  - c. Review approved submittals.
  - d. Review inspection and testing requirements.
  - e. Review environmental conditions and procedures for coping with unfavorable conditions.
  - f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
3. Record discussions, including decisions and agreements, and prepare report.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

## **1.7 PROJECT CONDITIONS**

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.
  - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.

## **1.8 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.
- B. Coordinate Shop Drawings and fabrication with hardware requirements.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
- B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.
- B. Provide materials that comply with requirements of "Architectural Woodwork Standards" quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

### **2.3 MATERIALS**

- A. Wood Species and Cut for Transparent Finish:
  - 1. Selections: As scheduled or as indicated in Design Selections.
- B. Wood Species for Opaque Finish: Any closed-grain hardwood unless indicated otherwise.
- C. Fire Retardant Wood Products for Paneling:

1. Medium-Density Fiberboard: ANSI A208.2, Grade MD.
2. Particleboard: ANSI A208.1, Industrial Grade M-2, 43 pcf (689 kgm3) Density.
3. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.

D. Wood Products for Cabinets:

1. Hardboard for Vertical Dividers Only: AHA A135.4, tempered, smooth two sides, 1/4 in (6 mm) minimum thickness unless indicated otherwise.
2. Medium-Density Fiberboard: ANSI A208.2, Grade MD.
3. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.
4. Softwood Plywood: DOC PS 1.

E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.

1. Fire-Rated Laminates: Where indicated or scheduled; NEMA LD 3, grades as follows:

- a. Vertical Surfaces: General Purpose Type 604 (VGF), 0.032 in (0.79 mm) thick.
- b. Horizontal Surfaces: General Purpose Type 605 (HGF) 0.048 in (1.2 mm) thick.

2. Manufacturers:

- a. Formica Corporation.
- b. International Paper.
- c. Lamin-Art, Inc.
- d. Nevamar Company, LLC; Decorative Products Div.
- e. Pioneer Plastics Corp.
- f. Westinghouse Electric Corp.; Specialty Products Div.
- g. Wilsonart International; Div. of Premark International, Inc.

3. Colors, Patterns, and Finishes:

- a. Selections: As scheduled or as indicated in Design Selections.

F. Chemical-Resistant, High-Pressure Decorative Laminate: NEMA LD 3, Grade HGP, and as follows:

1. Laminate has the following ratings when tested with indicated reagents according to NEMA LD 3, Test Procedure 3.9.5:

- a. Nitric Acid (30 Percent): Moderate effect.
- b. Sulfuric Acid (77 Percent): Moderate effect.
- c. Hydrochloric Acid (37 Percent): Moderate effect.
- d. Phosphoric Acid (75 Percent): No effect.
- e. Acetic Acid (98 Percent): No effect.
- f. Formaldehyde: No effect.
- g. Ethyl Acetate: No effect.
- h. Ethyl Ether: No effect.
- i. Phenol (85 Percent): Moderate effect.
- j. Benzene: No effect.
- k. Xylene: No effect.
- l. Butyl Alcohol: No effect.

- m. Furfural: No effect.
- n. Methyl Ethyl Ketone: No effect.
- o. Sodium Hydroxide (25 Percent): No effect.
- p. Sodium Sulfide (15 Percent): No effect.
- q. Ammonium Hydroxide (28 Percent): No effect.
- r. Zinc Chloride: No effect.
- s. Gentian Violet: No effect.
- t. Methyl Red: No effect.

2. Manufacturers and Products:

- a. Formica Corporation; Lab Grade 840 Black.
- b. Panolam Industries International Incorporated; Pionite Chemguard.
- c. Wilsonart International, Div. of Premark International, Inc.; Chemsurf.

3. Colors, Patterns, and Finishes:

- a. Selections: As scheduled or as indicated in Design Selections.

G. PVC Laminate: Fire-retardant acrylic/PVC sheet covered in a decorative rigid PVC veneer, 0.040 in (1 mm) thick.

- 1. Manufacturer and Product: Spectrim; Ven4ma.
- 2. Colors, Patterns, and Finishes:

- a. Selections: As scheduled or as indicated in Design Selections.

H. Simulated Stone Trim:

- 1. Solid Surface Material: Homogeneous solid pieces of filled plastic resin complying with ANSI SS1.

a. Manufacturers:

- 1) Avonite Surfaces.
- 2) E. I. du Pont de Nemours and Company.
- 3) Formica Corporation.
- 4) LG Chemical, Ltd.
- 5) Meganite Inc.
- 6) Samsung Chemical USA, Inc.
- 7) Swan Corporation (The).
- 8) Transolid, Inc.
- 9) Wilsonart International.

- 2. Quartz Agglomerate: Solid pieces consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with the "Physical Characteristics of Materials" Article of ANSI SS1.

a. Manufacturers:

- 1) Cambria.
- 2) Cosentino USA.

- 3) E. I. du Pont de Nemours and Company.
- 4) LG Chemical, Ltd.
- 5) Meganite Inc.
- 6) Samsung Chemical USA, Inc.
- 7) Technistone USA, Inc.
- 8) Transolid, Inc.

3. Colors, Patterns, and Finishes:

- a. Selections: As scheduled or as indicated in Design Selections.

## 2.4 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated or required, use materials complying with requirements in this Article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified.
  1. Do not use treated materials that do not comply with requirements of referenced woodworking standard or that are warped, discolored, or otherwise defective.
  2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
  3. Identify fire-retardant-treated materials with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Comply with performance requirements of AWP C20 (lumber) and AWP C27 (plywood). Use the following treatment types:
  1. Exterior Type: Organic-resin-based formulation thermally set in wood by kiln drying.
  2. Interior Type A: Low-hygroscopic formulation.
  3. Mill lumber before treatment and implement special procedures during treatment and drying processes that prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of treated woodwork.
  4. Kiln-dry materials before and after treatment to levels required for untreated materials.
- C. Fire-Retardant Particleboard: Panels complying with the following requirements, made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 25 or less per ASTM E 84.
- D. Fire-Retardant Fiberboard: Medium-density fiberboard panels complying with ANSI A208.2, made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 200 or less per ASTM E 84.

## 2.5 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 08 Section "Door Hardware (Scheduled by Describing Products)."

- B. Hinges: Provide number of hinges recommended by hinge manufacturer for size and weight of door.
- C. Butt Hinges: 2-3/4 in (69 mm), 5-knuckle steel hinges made from 0.095 in (2.4 mm) thick metal, and as follows:
  - 1. Semi-concealed Hinges for Flush Doors: BHMA A156.9, B01361.
  - 2. Semi-concealed Hinges for Overlay Doors: BHMA A156.9, B01521.
- D. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602,
  - 1. Product Standard: Grass, "Tiomos 120 Series", 120 degree swing, self-closing from 10 deg.
- E. Back-Mounted Pulls: BHMA A156.9, B02011.
- F. Wire Pulls: Back mounted, solid metal, 4 in (100 mm) long, 5/16 in (8 mm) in diameter.
  - 1. Product Standard: EPCO-MC-402-4, 4 in (100 mm) center to center of screws, 1-5/16 in (34 mm) projection, 5/16 in (8 mm) diameter. Stainless steel.
- G. Catches: Magnetic catches, BHMA A156.9, B03141.
- H. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.
- I. Shelf Rests: BHMA A156.9, B04013; metal.
  - 1. Product Standard: K & V No. 345, nickel plated.
- J. Drawer Slides: BHMA A156.9, B05091.
  - 1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated steel ball-bearing slides.
  - 2. Box Drawer Slides: Grade 1HD-100; for drawers not more than 6 in (150 mm) high and 24 in (600 mm) wide.
    - a. Product Standard for 24 in (600 mm) Wide and Less: Full extension; Accuride "7434".
    - b. Product Standard for Wider than 24 in (600 mm): Full extension; Accuride "7432".
  - 3. File Drawer Slides: Grade 1HD-200; for drawers more than 6 in (150 mm) high or 24 in (600 mm) wide.
    - a. Product Standard for 42 in (1050 mm) Wide and Less: Full extension with 1 in (25 mm) over travel; Accuride "3640".
  - 4. Pencil Drawer Slides: Grade 1; for drawers not more than 3 in (75 mm) high and 24 in (600 mm) wide.
    - a. Product Standard for 16 in (400 mm) Wide and Less: Low profile, 75 lb (34 kg) load rating (at 2/3 travel), full extension; Accuride "2632".

- b. Keyboard Slides: Grade 1HD-100; for computer keyboard shelves.
  - c. Product Standard for Slides Only, 16 in (400 mm) Wide and Less: Adjustable height, 75 lb (34 kg) load rating; Accuride "2109".
  - d. Product Standard for Slides and Tray: Fixed tilt, adjustable height; Accuride "Cbergo-Tray 200".
  - e. Product Standard for Slides, Tray and Accessories: Adjustable tilt, adjustable height, cable management, palm rest, and mouse pad; Accuride "Cbergo-Tray 300".
- 5. Trash Bin Slides: Grade 1HD-200; for trash bins not more than 20 in (500 mm) high and 16 in (400 mm) wide.
- K. Aluminum Slides for Sliding Glass Doors: BHMA A156.9, B07063.
- L. Door Locks: BHMA A156.11, E07121.
  - 1. Product Standard: K & V No. 984, nickel plated.
- M. Drawer Locks: BHMA A156.11, E07041.
  - 1. Product Standard: K & V No. 986, nickel plated.
- N. Sliding Door Locks:
  - 1. Product Standard: K & V No. 984, nickel plated.
- O. Grommets for Cable Passage through Countertops: Molded-plastic grommets and matching plastic caps with slot for wire passage.
  - 1. Size: 1-1/4 in (32-mm) or 2 in (50 mm) OD as indicated.
  - 2. Color: Brown or black as indicated.
  - 3. Product Standards: Doug Mockett & Company, Inc "OG or SG Series" or Hafele 429.93.
- P. Concealed Pocket Door Slides (Vertical Swing/Slide/Retract):
  - 1. Description: Side mounted flipper door slide assembly suitable for recessed full overlay door, 42 in (1050 mm) high and less, 30 lb (14 kg) load rating, into concealed pocket within cabinet, painted steel slides with all steel ball bearings.
  - 2. Product Standard: Accuride – "1321".
- Q. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
  - 1. Satin Stainless Steel: BHMA 630, unless otherwise indicated.
- R. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.
  - 1. Table Legs:

- a. Product Standard: Richelieu; Round Table Legs, Product UC250175, 28 in (711.2 mm) long by 2-1/2 in (62 mm) diameter steel table leg with satin chrome finish.
- S. Tackable Wall Surface: Refer to Division 09 Section "Fabric Wrapped Panels".

## **2.6 MISCELLANEOUS MATERIALS**

- A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.
- C. Adhesives:
  - 1. General: As recommended by woodwork fabricator to suit application.
  - 2. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24) unless indicated otherwise:
    - a. Wood Glues: 30 g/L.
    - b. Contact Adhesive: 250 g/L.
  - 3. Adhesive for Bonding Plastic Laminate Faces and Edges: PVA as recommended by woodwork fabricator to suit application.
- D. Hanging Clips: Provide manufacturer's standard nonferrous-metal or hot-dip galvanized zee hanging clips.

## **2.7 FABRICATION, GENERAL**

- A. Interior Woodwork Grade: Unless otherwise indicated, provide Premium Grade interior woodwork complying with referenced quality standard.
- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
- C. Fire Retardant Treated Wood: Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- D. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
  - 1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members 3/4 in (19 mm) Thick or Less: 1/16 in (1.5 mm).
  - 2. Edges of Rails and Similar Members More Than 3/4 in (19 mm) Thick: 1/8 in (3 mm).

- E. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
  - 1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
  - 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.
- F. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
  - 1. Countertops: Seal edges of openings in countertops.
- G. Install glass to comply with applicable requirements in Division 08 Section "Glazing" and in GANA's "Glazing Manual". For glass in wood frames, secure glass with removable stops.

## **2.8 PLASTIC-LAMINATE CABINETS**

- A. Grade: Premium.
- B. AWI Type of Cabinet Construction: Flush overlay unless indicated otherwise.
- C. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
  - 1. Horizontal Surfaces Other Than Tops: Grade HGP, .038 in (1 mm) thick.
  - 2. Postformed Surfaces: Grade HGP, .038 in (1 mm) thick.
  - 3. Doors and Vertical Surfaces: Grade VGS, .028 in (0.7 mm) thick.
  - 4. Edges: PVC Edge Banding, 0.12 in (3 mm) thick, matching laminate in color, pattern, and finish.
  - 5. Edges: Grade HGS, .048 in (1.2 mm) thick.
- D. Semi-exposed Surfaces: Provide surface materials indicated below:
  - 1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, Grade CLS, .020 in (0.5 mm) thick.
  - 2. Edges: PVC Edge Banding, .038 in (1 mm) thick, matching laminate in color, pattern, and finish.
  - 3. Drawer Sides, Backs and Sub-Fronts: 1/2 in (12 mm) minimum thickness, as indicated.
    - a. Solid-hardwood lumber.
  - 4. Drawer Bottoms: 1/4 in (6 mm) minimum thickness, as indicated.

- a. Hardwood plywood with veneer core.
  - b. High pressure decorative laminate with veneer core plywood.
- 5. Drawer Box Construction: One of the following:
  - a. Glued multiple dovetail.
  - b. Glued French dovetail.
  - c. Glued and doweled.
- 6. Interior Drawer Box Finish, as indicated:
  - a. Clear catalyzed polyurethane.
  - b. High-pressure decorative laminate, Grade CLS, .020 in (0.5 mm) thick.
- E. Body Members (Ends, Divisions, Bottoms and Sub-Tops): Medium-density fiberboard, 3/4 in (19 mm) minimum thickness.
- F. Face Frames, Rails, Kicks and Bases: Solid-hardwood lumber or hardwood plywood, 3/4 in (19 mm) thick minimum thickness.
- G. Face Frames and Rails: Solid-hardwood lumber or hardwood plywood, 3/4 in (19 mm) thick minimum thickness.
- H. Kicks and Bases: Solid-hardwood lumber, 1 1/2 (38 mm) thick minimum thickness.
- I. Shelves: Hardwood plywood with veneer core with the following thickness:
  - 1. For Spans Up To 32 in (800 mm): 3/4 in (19 mm).
  - 2. For Spans Up To 42 in (1050 mm): 1 in (25 mm).
- J. Drawer Fronts: Medium density fiberboard, 3/4 in (19 mm) thick minimum thickness.
- K. Doors:
  - 1. Hinged Flush Type: Medium density fiberboard with minimum thickness of 3/4 in (19 mm).
    - a. Maximum cabinet door size: 24 in (600 mm) width and 84 in (2100 mm) height.
    - b. Maximum cabinet door size: 20 in (500 mm) width and 84 in (2100 mm) height.
    - c. For Doors Larger than Sizes Above: 1-3/8 in (35 mm) or 1-3/4 in (45 mm) doors; refer to Division 08 Section "Flush Wood Doors".
    - d. If hinge screws enter only edge of door, provide 3/4 in (19 mm) lumber edges glued to core prior to laminating.
  - 2. Sliding Flush Type: As required by referenced quality standard for grade specified.
  - 3. Stile and Rail Type: As required by referenced quality standard for grade specified.
- L. Concealed Backs of Panels with Exposed Plastic Laminate Surfaces: High-pressure decorative laminate, Grade BKL, .020 in (0.5 mm) thick.

- M. Concealed Edges of Base Cabinet Panels: Including but not limited to floors, vertical edges, splashes and countertops; Clear Catalyzed Polyurethane.

## **2.9 PLASTIC-LAMINATE COUNTERTOPS**

- A. Grade: Premium.
- B. High-Pressure Decorative Laminate Grade:
  - 1. High-Pressure Decorative Laminate Grade for Flat Countertops: Grade HGS, .048 in (1.2 mm) thick.
  - 2. High-Pressure Decorative Laminate Grade for Post-formed Countertops: Grade HGP, .038 in (1.0 mm) thick.
- C. Grain Direction for Wood Grain Laminates: Parallel to cabinet fronts.
- D. Edge Treatment: PVC edge banding, 0.12 in (3 mm) thick, matching laminate in color, pattern, and finish, as indicated.
- E. Core Material for Countertops: Medium-density fiberboard made with exterior glue, 3/4 in (19 mm) thick minimum thickness.
- F. Core Material for Side and Back Splashes: Medium-density fiberboard made with exterior glue, 1/2 in (13 mm) thick minimum thickness.
- G. Backer Sheet: Provide plastic-laminate backer sheet, Grade BKL, .020 in (0.5 mm) thick, on underside of countertop substrate.
- H. Concealed Backs and Edges at Side and Back Splashes: High-pressure decorative laminate, Grade BKL, .020 in (0.5 mm) thick.

## **2.10 SOLID SURFACING COUNTERTOPS**

- A. Refer to Division 12 Section "Simulated Stone Countertops".

## **2.11 QUARTZ AGGLOMERATE COUNTERTOPS**

- A. Refer to Division 12 Section "Simulated Stone Countertops".

## **2.12 CLOSET AND UTILITY SHELVING**

- A. Grade: Custom.
- B. Shelf Material: 3/4 in (19 mm) solid lumber or veneer-faced panel product with solid-lumber edge.
- C. Cleats: 3/4 in (19 mm) solid lumber.

## **2.13 SHOP FINISHING**

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

- B. General: Finish architectural woodwork at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- C. Shop Priming: Shop apply the prime coat including backpriming, if any, for items specified to be field finished. Refer to Division 09 Painting Sections for material and application requirements.
- D. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.
  - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling and to end-grain surfaces. Concealed surfaces of plastic-laminate-clad woodwork do not require backpriming when surfaced with plastic laminate.
- E. Finish:
  - 1. Selections: As scheduled or as indicated in Design Selections.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive interior architectural woodwork and associated work to which interior architectural woodwork will be applied for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

#### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Quality standards. (The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with such selections and requirements in addition to the quality standard.)
  - 2. Respective manufacturer/fabricator's written installation instructions.
  - 3. Accepted submittals.
  - 4. Contract Documents.

#### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

- B. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.
- C. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

### **3.4 INSTALLATION**

- A. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication, to extent that it was not completed in the shop.
- B. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 in per 96 in (3 mm per 2400 mm).
- C. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- D. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- E. Cabinets, General: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
  - 1. Install cabinets with no more than 1/8 in per 96 in (3 mm per 2400 mm) sag, bow, or other variation from a straight line.
- F. Base and Wall Cabinets: Set base cabinets straight, level, and plumb. Adjust subtops within 1/16 in (1.5 mm) of a single plane. Fasten base cabinets to partition framing, or reinforcements in partitions with fasteners spaced 24 in (600 mm) on center. Bolt adjacent cabinets together with joints flush, tight, and uniform.
  - 1. Where base cabinets are not installed adjacent to walls, fasten to floor at toe space with fasteners spaced 24 in (600 mm) on center. Secure sides of cabinets to floor, where they do not adjoin other cabinets, with not less than two fasteners.
  - 2. Wall Cabinets: Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 in (400 mm) on center with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish or toggle bolts through metal backing or metal framing behind wall finish.
- G. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
  - 1. Where possible make field jointing in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.

2. Plastic Laminate Countertops: Secure field joints in plastic-laminate countertops with concealed clamping devices located within 6 in (150 mm) of front and back edges and at intervals not exceeding 24 in (600 mm). Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.
  3. Abut top and edge surfaces in one true plane, with internal supports placed to prevent deflection.
  4. Simulated Stone Countertops: Refer to Division 12 Section "Simulated Stone Countertops".
  5. Install countertops with no more than 1/8 in per 96 in (3 mm per 2400 mm) sag, bow, or other variation from a straight line.
  6. Secure backsplashes to tops with concealed metal brackets at 16 in (400 mm) on center and to walls with adhesive.
  7. Calk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants".
- H. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

### **3.5 ADJUSTING AND CLEANING**

- A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

### **END OF SECTION**

**17-13 OSU, College of Osteopathic Medicine at Cherokee  
Nation  
Childers Architect  
2019-07-26**

**INTERIOR ARCHITECTURAL  
WOODWORK**

**06 4023 - 18**

**SECTION 06 6400**  
**PLASTIC (FRP) PANELING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section includes glass-fiber reinforced plastic (FRP) wall paneling and trim accessories.
- B. Related Sections:
  - 1. Division 10 Section "Wall and Corner Guards" for adhesive-applied impact-resistant wall protection systems labeled as Plastic Wall Protection.

**1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.
- C. Samples for Initial Selection: For plastic paneling and trim accessories.
- D. Samples for Verification: For plastic paneling and trim accessories, in manufacturer's standard sizes.

**1.3 INFORMATIONAL SUBMITTALS**

- A. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.

**1.4 QUALITY ASSURANCE**

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame-Spread Index: 25 or less.
  - 2. Smoke-Developed Index: 450 or less.
  - 3. Testing Agency: Acceptable to authorities having jurisdiction.

**1.5 PROJECT CONDITIONS**

- A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

- B. Environmental Limitations: Do not deliver or install plastic paneling until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

## **1.6 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to Conditions of the Contract and Division 01 Section "Substitution Procedures".

### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

### **2.3 PLASTIC SHEET PANELING**

- A. General: Gelcoat-finished, glass-fiber reinforced plastic panels complying with ASTM D 5319.

#### **1. Manufacturers:**

- a. Crane Composites (Kemlite)
- b. Marlite.
- c. Nudo Products, Inc.

#### **2. Nominal Thickness: Not less than 0.09 in (2.3 mm).**

#### **3. Surface Finish: Molded pebble texture.**

#### **4. Color: As scheduled or as indicated in Design Selections.**

### **2.4 ACCESSORIES**

- A. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.

#### **1. Color: Match panels.**

- B. Exposed Fasteners: Nylon drive rivets recommended by panel manufacturer.

- C. Concealed Mounting Splines: Continuous, H-shaped aluminum extrusions designed to fit into grooves routed in edges of factory-laminated panels and to be fastened to substrate.

- D. Adhesive: As recommended by plastic paneling manufacturer.

1. VOC Content: 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- E. Sealant: Single-component, mildew-resistant, neutral-curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Division 07 Section "Joint Sealants."
  1. VOC Content: 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

#### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  1. Respective manufacturer written installation instructions.
  2. Accepted submittals.
  3. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

#### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
- B. At existing partitions-to-remain:
  1. Remove wallpaper, vinyl wall covering, loose or soluble paint, and other materials that might interfere with adhesive bond.
  2. Prepare substrate by sanding high spots and filling low spots as needed to provide flat, even surface for panel installation
- C. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.
- D. Lay out paneling before installing. Locate panel joints so that trimmed panels at corners are not less than 12 in (300 mm) wide.

1. Mark plumb lines on substrate at trim accessory locations for accurate installation.
2. Locate trim accessories to allow clearance at panel edges according to manufacturer's written instructions.

### **3.4 INSTALLATION**

- A. Install plastic paneling according to manufacturer's written instructions.
- B. Install panels in a full spread of adhesive.
- C. Install trim accessories with adhesive.
- D. Fill grooves in trim accessories with sealant before installing panels and bed inside corner trim in a bead of sealant.
- E. Maintain uniform space between panels and wall fixtures. Fill space with sealant.
- F. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

### **3.5 FINISH SCHEDULE**

- A. Color: As selected by Architect from manufacturer's full range.

**END OF SECTION**

## **SECTION 071616**

### **CRYSTALLINE WATERPROOFING**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Crystalline waterproofing system and supplementary items necessary for its installation in locations as follows:

1. Negative side applications at the elevator pit walls and slab.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
1. Include manufacturer's specifications for materials and installation instructions.
  2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.
  3. Include manufacturer's standard drawing details for each condition encountered in Work, including, but not limited to, substrate joint and crack treatments, waterproofing applications, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

##### **1.3 INFORMATIONAL SUBMITTALS**

- A. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
- B. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".
- C. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.
- D. Qualification Data:
1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
- E. Warranty: Sample of warranty.
1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

#### **1.4 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 10 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Installer Qualifications:
  - 1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  - 2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
  - 3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.

#### **1.5 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.
  - 1. Participants:
    - a. Architect.
    - b. Contractor, including superintendent.
    - c. Installer, including project manager and supervisor.
    - d. If requested, Manufacturer's qualified technical representative.
    - e. Installers of other construction interfaced with Work.
  - 2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
    - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
    - b. Review Contract Document requirements.
    - c. Review approved submittals.
    - d. Review inspection and testing requirements.
    - e. Review environmental conditions and procedures for coping with unfavorable conditions.
    - f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
  - 3. Record discussions, including decisions and agreements, and prepare report.

#### **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver liquid materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.

- B. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by waterproofing manufacturer.
- C. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- D. Protect stored materials from direct sunlight.

#### **1.7 PROJECT CONDITIONS**

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by manufacturer. Do not apply waterproofing to a damp or wet substrate or during high humidity conditions including snow, rain, fog, or mist.

#### **1.8 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

#### **1.9 WARRANTY**

- A. Manufacturer's Warranty: Furnish manufacturer's written material and labor warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design and installation of product. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

- 1. Warranty Period: Manufacturer shall warrant the products to be free from material and labor Defects for a period of 10 years from date of Substantial Completion.

- B. Installer's Warranty: Furnish installer's written workmanship warranty signed by an authorized representative using installer's standard form agreeing to provide labor required to repair or replace work which exhibits workmanship defects. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

- 1. Warranty Period: Installer shall warrant the installation to be free from workmanship Defects for a period of 2 years from date of Substantial Completion.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
- B. Available Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those listed.

## **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

## **2.3 CRYSTALLINE WATERPROOFING MATERIALS**

- A. Crystalline Waterproofing: Pre-packaged, gray colored proprietary blend of portland cement, specially treated sand, and active chemicals that, when mixed with water and applied, penetrates into cementitious substrates and reacts chemically with byproducts of cement hydration in presence of water to develop crystalline growth within substrate capillaries to produce an impervious, dense, waterproof substrate.
  - 1. Minimum Physical Properties:
    - a. Water Permeability: Maximum zero for water at 30 ft (9 m) according to CE CRD-C 48.
    - b. Compressive Strength: Minimum 3000 psi (20 MPa) at 28 days according to ASTM C 109 / C 109M.
    - c. Flexural Strength: Minimum 700 psi (1.5 MPa) at 28 days according to ASTM C 348 / C 348M.
  - 2. Potable Water Compatibility: Complies with NSF/ANSI 61 "Drinking Water System Component - Health Effects."
  - 3. Manufacturers and Products:
    - a. AQUAFIN, Inc.; AQUAFIN-IC.
    - b. BASF Building Systems; MasterSeal 500 (Formerly Tegraproof).
    - c. Euclid Tamms; HEY'DI K-11.
    - d. Kryton Group of Companies; Krystol T1 & T2 Waterproofing System.
    - e. Tremco; Permaquik Crystalline Waterproofing.
    - f. Vandex USA LLC; Vandex Super/Super White.
    - g. Xypex Chemical Corp.; Xypex Concentrate / Xypex Modified.

## **2.4 ACCESSORY MATERIALS**

- A. General: Furnish accessory materials recommended by waterproofing system manufacturer for intended use and compatible with waterproofing.
- B. Patching Compound: Factory-premixed cementitious repair mortar, crack filler, or sealant recommended by waterproofing manufacturer for filling and patching tie holes, honeycombs, reveals, and other imperfections; compatible with substrate and other materials indicated; provided by waterproofing manufacturer.
  - 1. Minimum Physical Properties:
    - a. Compressive Strength: 4000 psi (27 MPa) at 28 days according to ASTM C 109.
    - b. Flexural Strength: 800 psi (5.7 MPa) at 28 days according to ASTM C 348.
    - c. Shrinkage: Minus 0.093 percent at 28 days and plus 0.073 percent at 90 days according to ASTM C 596.

- C. Plugging Compound: Factory-premixed cementitious compound with hydrophobic properties and recommended by waterproofing manufacturer; resistant to water and moisture but vapor permeable for all standard applications (vertical, overhead, and horizontal surfaces not exposed to vehicular traffic); compatible with substrate and other materials indicated; provided by waterproofing manufacturer.
  - 1. Minimum Physical Properties:
    - a. Compressive Strength: 2800 psi (19.3 MPa) at 28 days according to ASTM C 109.
    - b. Flexural Strength: 320 psi (2.2 MPa) at 28 days according to ASTM C 348.
- D. Protective Topping at Horizontal Surfaces: Provide one of the following:
  - 1. Portland Cement Topping: ASTM C 150, Type I, sand per ASTM C 144, potable water and admixtures provided by waterproofing manufacturer.
  - 2. Manufacturer's Topping / Hardener: Manufacturer's recommended protective topping or hardener product.

## **2.5 MIXES**

- A. Crystalline Waterproofing: Add prepackaged dry ingredients to water according to manufacturer's written instructions. Mix together with mechanical mixer or by hand to required consistency.
- B. Protective Topping at Horizontal Surfaces:
  - 1. Portland Cement Topping: Measure, batch, and mix Portland cement and sand in proportion of 1:3 and water. Blend together with mechanical mixer to required consistency.
  - 2. Manufacturer's Topping / Hardener: Mix according to manufacturer's written instructions.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer's written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.

### 3.3 PREPARATION

- A. General: Comply with manufacturer's instructions, recommendations and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
- B. Active Water Leaks: Stop with plugging compound according to waterproofing manufacturer's written instructions.
- C. Substrate Repair: Repair damaged or unsatisfactory substrate with patching compound according to manufacturer's written instructions.
  - 1. At holes and cracks in substrate, remove loosened chips and cut reveal with sides perpendicular to surface, not tapered, and approximately 1 in (25 mm) deep. Fill reveal with patching compound flush with surface.
- D. Surface Preparation: Comply with waterproofing manufacturer's written instructions to remove efflorescence, chalk, dust, dirt, mortar spatter, grease, oils, paint, curing compounds, and form-release agents to ensure that waterproofing bonds to surfaces.
  - 1. Concrete: Clean concrete surfaces according to ASTM D 4258.
    - a. Verify concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.
    - b. Verify concrete is visibly dry and free of moisture.
    - c. Remove fins, ridges, mortar, and other projections.
    - d. Verify honeycomb voids, rock pockets, form tie holes, and other defects are filled by other Division 03 Sections.
    - e. Remove debris, standing water, oily substances, mud, grease, oil, bitumen, form-release agents, paints, curing compounds, penetrating contaminants or film-forming coatings from concrete, and similar substances.
    - f. Etch scratch and float finished concrete with 10 percent muriatic (hydrochloric) acid solution according to ASTM D 4260.
    - g. Prepare smooth formed and trowel finished concrete by mechanical abrading according to ASTM D 4259.
  - 2. Concrete Unit Masonry: Clean concrete unit masonry surfaces according to ASTM D 4261.
    - a. Lightweight Concrete Unit Masonry: Etch with 10 percent muriatic (hydrochloric) acid solution or abrade surface by wire brushing. Remove acid residue until pH readings of water after rinse are not more than 1.0 pH lower or 2.0 pH higher than pH of water before rinse.
    - b. Medium- and Normal-Weight Concrete Unit Masonry: Sandblast or bushhammer to a depth of 1/16 in (1.5 mm).
  - 3. Concrete Joints: Clean reveals according to waterproofing manufacturer's written instructions.

### 3.4 CRYSTALLINE WATERPROOFING INSTALLATION

- A. Application:

1. Saturate surface with water for several hours prior to application and maintain damp condition until applying waterproofing. Remove standing water.
2. Do not allow waterproofing, patching, and plugging materials to enter reveals or annular spaces intended for resilient sealants or gaskets, such as joint spaces between pipes and pipe sleeves.
3. Number of Coats: As directed by manufacturer's installation instructions.
4. Application Method: Brush or spray. Apply to ensure that each coat fills voids and is in full contact with substrate or previous coat. Dampen surface between coats.
5. Final Coat Finish: Brushed or spray textured.
6. Curing: Moist cure waterproofing as required by manufacturer immediately after final coat has set, followed by not less than 2 days air drying, unless otherwise recommended in writing by manufacturer.

B. Waterproofing Treatment Extensions: Extend waterproofing treatment as follows:

1. Elevator Pits: Onto every substrate in areas indicated for treatment, including pipe trenches, pipe chases, pits, sumps, and similar offsets and features.
2. Back Side of Exterior Single-Wythe CMU Walls: Onto columns integral with treated walls, including non-treated walls intersecting treated walls, for a distance of 24 in (600 mm) for cast-in-place concrete and 48 in (1200 mm) for masonry.
3. Pools or Cisterns: Onto every substrate on "wet" side of pool or cistern.

### 3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.

1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, **observations, evaluations, and problem diagnostics.**

### 3.6 PROTECTION

A. Requirements: Protect applied waterproofing from rapid drying, severe weather exposure, and water accumulation. Maintain completed Work in moist condition for not less than 3 days by procedures recommended in writing by waterproofing manufacturer. Protect waterproofing from temperatures below 36 deg F. (11 deg C).

B. Protective Topping at Horizontal Surfaces:

1. Portland Cement Topping: Apply minimum 1 in (25 mm) thick portland cement protective topping over floor surfaces.
2. Manufacturer's Topping / Hardener: Apply according to manufacturer's written instructions.

**END OF SECTION**



**SECTION 07 1800**  
**TRAFFIC COATINGS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes: Traffic coatings and supplementary items necessary for application.

**1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, application instructions, and recommendations for maintenance.
- B. Shop Drawings: Show extent of each traffic coating. Include details for treating substrate joints and cracks, flashings, deck penetrations, and other termination conditions.
- C. Samples for Initial Selection: For each type of exposed finish.
- D. Samples for Verification Purposes: For each type of traffic coating required, prepared on rigid backing and of same thickness and material indicated for the Work.
  - 1. Provide stepped samples on backing large enough to illustrate build-up of traffic coatings.

**1.3 INFORMATIONAL SUBMITTALS**

- A. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
- B. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".
- C. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its products and systems are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.
- D. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
- E. Warranty: Sample of warranty.
  - 1. Provide manufacturer's written warranty covering materials and application (labor) stating obligations, remedies, limitations and exclusions.

#### **1.4 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: To include in maintenance manuals. Include recommendations for periodic inspections, cleaning, care, maintenance, and repair of traffic coatings.

#### **1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 10 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Applicator Qualifications:
  - 1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  - 2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
  - 3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.
- C. Fire-Test-Response Characteristics: Provide traffic coating materials with the fire-test-response characteristics as determined by testing identical products per test method below for deck type and slopes indicated by an independent testing and inspecting agency that is acceptable to authorities having jurisdiction.
  - 1. Roof Coverings: Provide materials identical to those of traffic coatings tested according to ASTM E 108/UL 790 for deck type and slopes indicated and that comply with requirements for roof-covering Class A.
  - 2. Mechanical/Equipment-rooms that Also Serve as a Return Air Plenum: Provide materials identical to those of traffic coatings tested according to ASTM E 84, where used in areas serving as a return air plenum that comply with requirements indicated.
    - a. Flame spread less than 25.
    - b. Smoke Density less than 50.
- D. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.
  - 1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.
    - a. Show typical components, attachments to building structure, and requirements of installation.
  - 2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
  - 3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.

4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

## **1.6 PRE-APPLICATION CONFERENCE**

- A. Pre-Application Conference: Before Work begins, conduct conference at Project site.
  1. Participants:
    - a. Architect.
    - b. Contractor, including superintendent.
    - c. Installer, including project manager and supervisor.
    - d. If requested, Manufacturer's qualified technical representative.
    - e. Installers of other construction interfaced with Work.
  2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
    - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
    - b. Review Contract Document requirements.
    - c. Review approved submittals.
    - d. Review inspection and testing requirements.
    - e. Review environmental conditions and procedures for coping with unfavorable conditions.
    - f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
  3. Record discussions, including decisions and agreements, and prepare report.

## **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials in original packages and containers with seals unbroken and bearing manufacturer's labels showing the following information:
  1. Manufacturer's brand name.
  2. Type of material.
  3. Directions for storage.
  4. Date of manufacture and shelf life.
  5. Lot or batch number.
  6. Mixing and application instructions.
  7. Color.
- B. Store materials in a clean, dry location protected from exposure to direct sunlight. In storage areas, maintain environmental conditions within range recommended in writing by manufacturer.

## **1.8 PROJECT CONDITIONS**

- A. Environmental Limitations: Apply traffic coatings within the range of ambient and substrate temperatures recommended in writing by manufacturer. Do not apply traffic coatings to damp or wet substrates, when temperatures are below 40 deg F (5 deg C), when relative humidity exceeds 85 percent, or when temperatures are less than 5 deg F (3 deg C) above dew point.
  - 1. Do not apply traffic coatings in snow, rain, fog, or mist, or when such weather conditions are imminent during the application and curing period. Apply only when frost-free conditions occur throughout the depth of the substrate.
- B. Do not apply traffic coating until items that will penetrate membrane have been installed.

## **1.9 COORDINATION**

- A. Coordinate application of products and systems with interfacing and adjoining construction to provide a successful application without failure.

## **1.10 WARRANTY**

- A. Manufacturer's Warranty: Furnish manufacturer's written material and labor warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design and application of product. "Defects" is defined to include but not limited to deterioration or failure to perform as required.
  - 1. Defects of traffic coatings includes, but is not limited to, the following:
    - a. Adhesive or cohesive failures.
    - b. Abrasion or tearing failures.
    - c. Surface crazing or spalling.
    - d. Intrusion of water, oils, gasoline, grease, salt, deicer chemicals, or acids into deck substrate.
  - 2. Warranty does not include deterioration or failure of traffic coating due to unusual weather phenomena, failure of prepared and treated substrate, formation of new substrate cracks exceeding 1/16 in (1.5 mm) in width, fire, vandalism, or abuse by maintenance equipment.
  - 3. Warranty Period: Manufacturer shall warrant the products to be free from material and labor Defects for a period of 5 years from date of Substantial Completion

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by manufacturer listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
  - 1. BASF Construction Chemicals, LLC – Building Systems.

2. Gaco Western LLC.
3. Neogard; Division of Jones-Blair.
4. Pacific Polymers International, Inc.
5. Pecora Corporation
6. Tremco Incorporated; an RPM company.

## **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

## **2.3 TRAFFIC COATINGS**

- A. Physical Requirements: Provide traffic coatings complying with ASTM C 957.
- B. Material Compatibility: Provide primers; base, intermediate, and top coats; and miscellaneous materials that are compatible with one another and with substrate under conditions of service and application, as demonstrated by the manufacturer based on testing and field experience.
- C. Primer: Manufacturer's standard factory-formulated primer recommended for substrate and conditions indicated.
- D. Preparatory and Base Coats: Single- or multi-component aromatic liquid urethane elastomer.
- E. Top Coat: Single- or multi-component aliphatic liquid urethane elastomer or aromatic liquid urethane elastomer with UV inhibitors.
  1. Color: As scheduled or as indicated in Design Selections.
- F. Component Coat Thicknesses: As recommended by traffic coating manufacturer for substrate and service conditions indicated.
- G. Aggregate: Uniformly graded washed silica sand of particle sizes, shape, and minimum hardness recommended in writing by traffic coating manufacturer.

## **2.4 MISCELLANEOUS MATERIALS**

- A. Joint Sealants: As specified in Division 07 Section "Joint Sealants".
- B. Sheet Flashing: 60 mil (1.5 mm) minimum uncured sheet neoprene or non-staining sheet material recommended by traffic coating manufacturer.
- C. Adhesive: Contact adhesive recommended in writing by traffic coating manufacturer.
- D. Reinforcing Strip: Fiberglass mesh recommended in writing by traffic coating manufacturer.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.
1. Verify compatibility with and suitability of substrates.
  2. Begin coating application only after minimum concrete curing and drying period recommended by traffic coating manufacturer has passed.
  3. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method according to ASTM D 4263 or as recommended by traffic coating manufacturer.

### **3.2 APPLICATION, GENERAL**

- A. Application Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
1. Respective manufacturer's written application instructions.
  2. Accepted submittals.
  3. Contract Documents.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective application or would cause latent defects in Work.
- B. Mask adjoining surfaces not receiving traffic coatings, deck drains, and other deck substrate penetrations to prevent spillage, leaking, and migration of coatings.
- C. Concrete Substrates: Mechanically abrade concrete surfaces to a uniform profile according to ASTM D 4259 using self-contained recirculating blast cleaning apparatus and manufacturer's recommendations. Do not acid etch.
1. Remove grease, oil, paints, and other penetrating contaminants from concrete.
  2. Remove concrete fins, ridges, and other projections.
  3. Remove laitance, glaze, efflorescence, curing compounds, concrete hardeners, form-release agents, and other incompatible materials that might affect coating adhesion.
  4. Remove remaining loose material to provide a sound surface, and clean surfaces according to ASTM D 4258.

### **3.4 TERMINATIONS AND PENETRATIONS**

- A. Prepare vertical and horizontal surfaces at terminations and penetrations through traffic coatings and at expansion joints, drains, and sleeves according to ASTM C 1127 and manufacturer's written recommendations.

- B. Provide sealant cants at penetrations and at reinforced and nonreinforced deck-to-wall butt joints.
- C. Terminate edges of deck-to-deck expansion joints with preparatory base-coat strip.
- D. Install sheet flashings at deck-to-wall expansion and dynamic joints, and bond to deck and wall substrates according to manufacturer's written recommendations.

### **3.5 JOINT AND CRACK TREATMENT**

- A. Prepare, treat, rout, and fill joints and cracks in substrates according to ASTM C 1127 and traffic coating manufacturer's written recommendations. Before coating surfaces, remove dust and dirt from joints and cracks according to ASTM D 4258.
  - 1. Comply with recommendations in ASTM C 1193 for joint-sealant installation.

### **3.6 TRAFFIC COATING APPLICATION**

- A. Apply traffic coating material according to ASTM C 1127 and manufacturer's written recommendations.
  - 1. Start traffic coating application in presence of manufacturer's technical representative.
  - 2. Mix materials according to manufacturer's instructions.
  - 3. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
  - 4. Apply coatings by spray, roller, notched squeegee, or other applicators according to manufacturer's recommendations.
  - 5. Apply total dry film thickness of traffic coating as indicated, but to not less than the minimum thickness recommended by the manufacturer. Apply each coating to the thickness recommended by the manufacturer.
  - 6. Apply aggregate into wet coating according to manufacturer's recommendations.
  - 7. Verify wet film thickness of each component coat every 100 sf (9 sm).
  - 8. Apply traffic coatings to prepared wall terminations and vertical surfaces to height indicated and omit aggregate on vertical surfaces.
- B. Pedestrian Traffic Coating: Apply primer, base, intermediate, and top coats and aggregate according to traffic coating manufacturer's recommendations and as follows:
  - 1. Normal Duty: Apply a minimum total dry film thickness of 30 mils (0.75 mm), excluding substrate primer and aggregate.
    - a. Aggregate: Apply aggregate at a minimum rate of 8 to 10 lb/100 sf (3.6 to 4.5 kg/10 sm) and backroll to imbed.
    - b. Location: Interior mechanical equipment rooms.

### **3.7 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.

1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.
- B. Verify applied thickness before material attains final set, by use of mil-thickness gage as work progresses. Immediately apply additional coating to produce required thickness where readings indicate thickness less than that specified.
- C. Visually inspect all areas for voids, damage, or rupture. Repair as required.

### **3.8 CURING AND PROTECTING**

- A. Cure traffic coatings according to manufacturer's written recommendations. Prevent contamination and damage during application and curing stages.
- B. Protect traffic coatings from damage and wear during remainder of construction period.

### **3.9 TRAFFIC COATINGS SCHEDULE**

- A. Pedestrian Traffic Coating: Provide at the following locations:
  1. Mechanical equipment rooms above occupied spaces.
  2. Top level of parking structure walking surfaces.
  3. All levels of parking structure walking surfaces.
  4. Other locations indicated on drawings.
- B. Vehicular Traffic Coating: Provide at the following locations:
  1. Top level of parking structure driving surfaces.
  2. All levels of parking structure driving surfaces.
  3. Other locations indicated on drawings.

### **3.10 COLOR SCHEDULE**

- A. Color: As selected by Architect from manufacturer's standard colors.

**END OF SECTION**

**SECTION 07 1900**  
**WATER REPELLENTS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section includes penetrating water repellent and supplementary items necessary to complete work required for its installation.

**1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.

**1.3 INFORMATIONAL SUBMITTALS**

- A. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.
- B. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
- C. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".
- D. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
- E. Certification by water repellent manufacturer that products supplied complies with local regulations controlling use of VOCs.
- F. Warranty: Sample of warranty.
  - 1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

**1.4 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Installer Qualifications:

1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
  3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.
- C. Testing Agency Qualifications: An independent testing agency with experience and capability to conduct testing indicated in "Performance Requirements" Article without delaying the Work, per ASTM E 548.
- D. Regulatory Requirements: Comply with applicable rules of pollution-control regulatory agency having jurisdiction in Project locale regarding VOCs and use of hydrocarbon solvents.
- E. Field Samples: Select one representative surface for each substrate to receive water repellents. Apply water repellent to each substrate, with either partial or full coverage as directed. Comply with application requirements of this Section.
1. Obtain approval of field samples before applying water repellents.
  2. Maintain field samples during construction in an undisturbed condition as a standard for judging the completed Work.

## **1.5 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

## **1.6 PROJECT CONDITIONS**

- A. Weather and Substrate Conditions: Do not proceed with application of water repellent under any of the following conditions, except with written instruction of manufacturer:
1. Ambient temperature is less than 40 deg F (4.4 deg C).
  2. Concrete surfaces have cured for less than 28 days.
  3. Rain or temperatures below 40 deg F (4.4 deg C) are predicted within 24 hours.
  4. Application is earlier than 24 hours after surfaces have been wet.
  5. Substrate is frozen or surface temperature is less than 40 deg F (4.4 deg C).
  6. Windy condition exists that may cause water repellent to be blown onto vegetation or surfaces not intended to be coated.

## **1.7 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **1.8 WARRANTY**

- A. Manufacturer's Warranty: Furnish manufacturer's written material and labor warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design of product. "Defects" are defined to include but not limited to deterioration or failure to perform as required.

1. Warranty does not include deterioration or failure of coating due to unusual weather phenomena, failure of prepared and treated substrate, formation of new joints and cracks in excess of 1/16 in (1.5 mm) wide, fire, vandalism, or abuse by maintenance equipment.
2. Warranty Period: Manufacturer shall warrant the products to be free from material and labor Defects for a period of 5 years from date of Substantial Completion

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".

1. Advanced Chemical Technologies, Inc.
2. Anti Hydro International, Inc
3. L&M Construction Chemicals, Inc.
4. Nox-Crete Products Group
5. PROSOCO, Inc.
6. Textured Coatings of America, Inc.

### **2.2 PERFORMANCE REQUIREMENTS**

- A. Provide water repellents with the following properties based on testing manufacturer's standard products, according to test methods indicated, applied to substrates simulating Project conditions using same materials and application methods to be used for Project.

1. Absorption: Minimum 90 percent reduction of absorption after 24 hours in comparison of treated and untreated specimens, per ASTM C642.
2. Water-Vapor Transmission: Maximum 10 percent reduction in rate of vapor transmission in comparison of treated and untreated specimens, per ASTM E 96.
3. Water Penetration and Leakage through Masonry: Maximum 90 percent reduction in leakage rate in comparison of treated and untreated specimens, per ASTM E 514.
4. Durability: Maximum 5 percent loss of water repellency after 2500 hours of weathering in comparison to specimens before weathering, per ASTM G 53.
5. Permeability: Minimum 80 percent breathable in comparison of treated and untreated specimens, per ASTM D 1653.
6. Chloride-Ion Intrusion in Horizontal Concrete: Transportation Research Board, National Research Council's NCHRP Report 244, Series II tests.
  - a. Reduction of Water Absorption: 80 percent.
  - b. Reduction in Chloride Content: 80 percent.

### **2.3 WATER REPELLENTS**

- A. Vertical Applications: Silane, 20 Percent Solids: Penetrating water repellent for vertical application. A monomeric compound containing approximately 20 percent alkyltrialkoxysilanes and meeting VOC/AIM regulations containing 3.3 lb./gal. VOCs or less.

- B. Horizontal Applications: Silane, 40 Percent Solids: Penetrating water repellent for horizontal application. A monomeric compound containing approximately 40 percent alkyltrialkoxysilanes and meeting VOC/AIM regulations containing 3.3 lb./gal. VOCs or less.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine substrates surfaces to receive water repellents and associated work and conditions under which work will be installed. Do not proceed with installation until unsatisfactory conditions have been corrected in a manner acceptable to Installer. Starting work within a particular area will be construed as applicator's acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work
- B. Test for pH level, according to water repellent manufacturer's written instructions, to ensure chemical bond to silicate minerals.
- C. Protect adjoining work, including sealant bond surfaces, from spillage or blow-over of water repellent. Cover adjoining and nearby surfaces of aluminum and glass if there is the possibility of water repellent being deposited on surfaces. Cover live plants and grass.
- D. Coordination with Sealants: Do not apply water repellent until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.
  - 1. Water-repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent, and sealant materials identical to those used in the work.
- E. Test Application: Before performing water-repellent work, including bulk purchase and delivery of products, prepare a small application in an unobtrusive location and in a manner approved by Architect to demonstrate the final effect (visual, physical, and chemical) of planned application. Proceed with work only after Architect approves test application or as otherwise directed.

### **3.4 APPLICATION**

- A. Apply a heavy-saturation spray coating of water repellent on surfaces indicated for treatment using low-pressure spray equipment. Comply with manufacturer's written instructions for using airless spraying procedure, unless otherwise indicated.
  - 1. Architectural Precast Concrete: At Contractor's option, first application of water repellent on precast concrete units may be completed before installing units. Mask sealant-bond surfaces to prevent water repellent from migrating onto joint surfaces.
- B. Apply a second saturation spray coating, repeating first application. Comply with manufacturer's written instructions for limitations on drying time between coats and after rainstorm wetting of surfaces between coats. Consult manufacturer's technical representative if written instructions are not applicable to Project conditions.

### **3.5 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.
  - 1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.

### **3.6 CLEANING**

- A. Protective Coverings: Remove protective coverings from adjacent surfaces and other protected areas.
- B. Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses. Repair damage caused by water-repellent application. Comply with manufacturer's written cleaning instructions.

### **3.7 SCHEDULE**

- A. Apply water repellents to following areas:
  - 1. Architectural precast concrete panels.

**END OF SECTION**



## **SECTION 07 2119**

### **SPRAY-APPLIED FOAM INSULATION**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Spray-applied foam installation and supplementary items necessary for a complete installation.
  - 1. Foam Insulation: Closed-cell spray-applied polyurethane foam insulation for the following locations:
    - a. Interior side of exterior wall assemblies.
    - b. Underside of elevated slab.
    - c. Other locations as indicated.
  - 2. Thermal Barrier: Thermal barrier applied to foam insulation for a thermal barrier rating of 15 minutes.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature and tested physical and performance properties for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
  - 2. Include manufacturer's printed instructions for evaluating, preparing, and treating substrates, temperature and other limitations of installation conditions.
- B. Samples: Submit clearly labeled samples, 12 in (300 mm) square of spray-applied thermal insulation on rigid backing and 3 by 4 inch (75 by 100 mm) minimum size of each additional material specified or required.
- C. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, and details of all typical conditions and components and attachments to other work.
  - 1. Show locations and extent of installations.
  - 2. Indicate intersections with other envelope assemblies and materials, and details showing how gaps in the construction will be bridged, how inside and outside corners are negotiated, how materials that cover or intersect the insulation are secured, and how miscellaneous penetrations such as conduits, pipes electric boxes and similar items are sealed.
  - 3. Indicate types of substrate preparations required before applying insulation.
    - a. Include recommended values for field adhesion test on each substrate.
  - 4. Show minimum thicknesses needed to achieve required thermal rating specified.

5. Thermal Barrier: Include graphic/visual definition of required 15 minute thermal barrier, completely protecting foam insulation, indicating all materials/assemblies used for this purpose. Include definition of thermal barriers and any other fire-protective assemblies/components provided in lieu of thermal barrier. At locations where metal fabrications penetrate foam insulation, or act as a thermal bridge from interior space to spray foam, clearly define method for fire protecting these metal fabrications and preventing unacceptable heat transfer to foam insulation.
6. Details shall include, but not be limited to, installations at the following conditions:
  - a. Firestopping sealant at slab edge.
  - b. Head, sill, and jamb of punched openings.
  - c. Expansion joints, penetrations, roof, and all terminations.
  - d. Connections to building structural frame.

### **1.3 INFORMATIONAL SUBMITTALS**

- A. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
  1. Certificates: Furnish manufacturer's certification that spray insulation is free of asbestos (including actinolite, amosite, anthophyllite, chrysotile, crocidolite and tremolite), or other toxic materials. Certify product is inert after installation.
  2. Compatibility and Adhesion Test Reports: From manufacturer indicating the following:
    - a. Compatibility to adjacent materials: Submit letter from manufacturer stating that materials proposed for use are permanently chemically compatible and adhesively compatible with adjacent materials proposed for use. Submit letter from manufacturer stating that cleaning materials used during installation are chemically compatible with adjacent materials proposed for use.
    - b. Materials have been tested for bond with substrates.
    - c. Materials have been verified by manufacturer to be compatible with substrate primers and coatings.
    - d. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- B. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required. In addition:
  1. Submit letter from primary materials manufacturer indicating approval of products not manufactured by primary manufacturer.
  2. Include statement that materials are compatible with adjacent materials proposed for use.
  3. Submit evidence indicating that field peel-adhesion test on all materials to which insulation are adhered have been performed and the changes made, if required, to other approved materials, in order to achieve successful adhesion.
- C. Qualification Data:
  1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.

- D. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
  - 1. Submit valid Evaluation Service Report (ESR) issued by International Code Council (ICC-ES) for adhered masonry veneer systems used in Project.
- E. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".
- F. Daily Reports: Submit daily construction activity reports that also indicate the following:
  - 1. Recorded site temperature and humidity and weather conditions.
  - 2. Spray rig settings.
  - 3. Spray-pass thicknesses.
- G. Warranty: Sample of warranty.
  - 1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

#### **1.4 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Installer Qualifications:
  - 1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  - 2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
  - 3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.
- C. Field Quality Control Testing Agency: Qualified independent testing and inspection agency to perform field tests and inspections and to prepare test reports as indicated in "Field Quality Control" article.
- D. VOC Regulations: Provide products which comply with applicable regulations controlling the use of volatile organic compounds.

#### **1.5 MOCK-UPS**

- A. Mock-ups: Before overall installation of spray insulation, construct an on-site, in-place mockup as required to verify construction methods, demonstrate qualities of materials and execution and to facilitate site testing. Include all components in the assembly, including penetrations and attachments. Build mockups to comply with the following requirements, using exposed and concealed materials indicated for the completed Work.

1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.
    - a. Minimum size:
      - 1) Interior Side of Exterior Wall Assemblies: 10 ft. (3 m) wide by floor-to-floor height; include intersecting floor slab and one representative window.
      - 2) Underside of Elevated Slab: 10 ft. by 10 ft. (3 m by 3 m); replicate representative penetrations and perimeter conditions.
  2. Notify Architect, Third party Inspection Agency, and manufacturer's representative and testing agency 7 days in advance of the dates and times when mockups will be constructed.
  3. Obtain approval of mockups from Architect, Third Party Inspection Agency, and manufacturer's representative before proceeding with overall installation of insulation system.
  4. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
  5. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
  6. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.
- B. Phased, Two-Part Installations: Site mockup should be constructed in phases that include the following:
1. Phase 1: Complete installation of foam insulation at mock-up location.
  2. Phase 2: Complete installation of thermal barrier over foam installation.
  3. Testing and approvals shall be obtained for each phase prior to proceeding to the next phase or proceeding with overall installation of products.
- C. Detail Review of Perimeter Firestops at Floor Line: At floor line edge of perimeter firestop system inspect mock up for damage or deformation to firestop system by foam insulation expansion during installation. After foam has cured, cut out and remove foam at this area and inspect integrity of firestop. If foam has affected the integrity of the firestop provide sheet metal angle above firestop to prevent downward expansion of foam insulation.
- D. Testing for Adhesion: Test site mock-up of materials for adhesion in accordance with manufacturer's recommendations. Perform test after curing period recommended by the manufacturer. Record mode of failure and area which failed in accordance with ASTM D 4541. Material manufacturer has established a minimum adhesion level for the product on the particular substrate; the inspection report shall indicate whether this requirement has been met.
1. Include test area at window anchor system (adhesion to metal anchor).
- E. Sampling for Dimensional Stability: Coordinate with testing agency for removal of representative samples from the mock-up application for laboratory testing of foam insulation dimensional stability. Testing agency will perform test in accordance with ASTM D2126 - Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging, except as modified herein:

1. Obtain dimensional stability test report from foam insulation manufacturer for specified foam insulation. Perform dimensional stability testing in accordance with ASTM D2126, date of standard as used for manufacturer's testing.
2. Perform ASTM D2126 test procedure at exposure conditions listed in manufacturer's dimensional stability test report.
3. Cut sample specimens from larger pieces of foam and immediately begin testing. Do not wait for "aging" period.
4. Report change in mass and dimensions at 3 days and 28 days, in addition to the exposure time recommended in ASTM D2126.
5. Photograph samples prior to conditioning and at each stage of testing procedure. Label and save photos according to date and sample number. Submit photographs and report data for review.
6. Foam insulation will be deemed of acceptable quality if change in volume (dimensional stability) does not exceed, by shrinkage or expansion, the manufacturers reported foam insulation percent volume change.

## **1.6 PRE-INSTALLATION CONFERENCE**

A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

1. Participants:
  - a. Architect.
  - b. Contractor, including superintendent.
  - c. Installer, including project manager and supervisor.
  - d. If requested, Manufacturer's qualified technical representative.
  - e. Installers of other construction interfaced with Work.
  - f. If requested, testing and inspection agencies.
2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
  - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
    - 1) Review ventilation or "fresh air" requirements.
  - b. Review Contract Document requirements.
  - c. Review approved submittals of details for the following conditions:
    - 1) Firestopping sealant slab edge
    - 2) Head, sill and jambs of punched windows.
    - 3) Expansion joints, penetrations, roof and terminations.
    - 4) Intersecting framing members.
  - d. Review construction and testing of mock-up, sequence of construction, coordination with substrate preparation, materials approved for use, compatibility of materials, coordination with installation of adjacent and covering materials, and details of construction.
    - 1) Review requirements of substrate to be dry and procedures to achieve this.
    - 2) Review adjacent surface protection and clean-up procedures and materials.

- 3) Review procedures to remedy voids that are identified after installation.
  - e. Review inspection and testing requirements.
  - f. Review environmental conditions and procedures for coping with unfavorable conditions.
  - g. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
3. Record discussions, including decisions and agreements, and prepare report.

#### **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials to Project site in original packages or containers with seals unbroken, labeled with manufacturer's name, product, date of manufacture, and directions for storage.
- B. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
- C. Protect against ignition at all times. Minimize the time that insulating materials are stored at project site before installation.

#### **1.8 PROJECT CONDITIONS**

- A. Temperature and humidity: Install within ambient temperature and humidity range and substrate temperatures recommended by foam insulation and thermal barrier manufacturers. Do not apply to a damp or wet substrate.
- B. Field Conditions: Do not install in snow, rain, fog, or mist.

#### **1.9 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

#### **1.10 WARRANTY**

- A. Manufacturer's Warranty: Furnish manufacturer's written material and labor warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design of product. "Defects" are defined to include but not limited to deterioration or failure to perform as required.
  1. Warranty Period: Manufacturer shall warrant the products to be free from material and labor Defects for the period stated below commencing from date of Substantial Completion
    - a. Foam Insulation: 10 years.
    - b. Thermal Barrier: 2 years.

- B. Installer's Warranty: Furnish installer's written workmanship warranty signed by an authorized representative using installer's standard form agreeing to provide labor required to repair or replace work which exhibits workmanship defects. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

1. Warranty Period: Installer shall warrant the installation to be free from workmanship Defects for a period of 2 years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".

- B. Available Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those listed.

1. Foam Insulation:

- a. NCFI Polyurethanes; INSULSTAR.
- b. BASF; WALLTITE US.
- c. Demilec (USA) LLC; HEATLOK Soy 200 Plus.
- d. JM Johns Manville; JM CORBOND III.

2. Thermal Barrier:

- a. Spray-Applied Cellulose Thermal Barrier: International Cellulose Corporation; Ure-K Thermal Barrier System.

### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

### **2.3 PERFORMANCE REQUIREMENTS**

- A. Foam Insulation: Materials shall meet or exceed the following performance requirements as indicated in the test reports.

- 1. Aged R-value: Minimum 6.2 per inch (per 25 mm), per ASTM C518.
- 2. Density: Nominal 2 lb/cu. ft. (24 kg/cu. m), per ASTM D1622.
- 3. Surface-Burning Characteristics: When tested according to ASTM E 84:
  - a. Flame Spread: Less than 25.
  - b. Smoke Developed: Less than 450.

4. Fire Propagation Characteristics: Passes both NFPA 259 and NFPA 285 testing as part of an approved assembly.
  5. Movement: Accommodate movements of building materials, capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope without damage or displacement, doesn't displace adjacent materials, and allows for the relative movement of assemblies due to thermal and moisture variations and creep, and anticipated movement.
- B. Thermal Barrier: Provide thermal barrier coatings, including primer and topcoats if required, with thermal barrier response characteristics indicated, as determined by testing identical products according to test method by testing agency indicated below. Identify containers containing thermal barrier coatings with appropriate markings of applicable testing and inspecting agency.
1. Surface-Burning Characteristics: When tested according to ASTM E 84:
    - a. Flame Spread: Less than 25.
    - b. Smoke Developed: Less than 450.
  2. ASTM E119/UBC 26-2 Test Method for the Evaluation of Thermal Barriers.
    - a. Thermal Rating over Foam Insulation: 15 Minutes.
  3. Bond Strength Minimum: 280 psi (1931 k Pa) per ASTM D 4541.
  4. Hazardous Substances: Provide products containing no detectable asbestos.
  5. VOC Content of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
    - a. Flat Paints, Coatings, and Primers: 50 g/L.
    - b. Nonflat Paints, Coatings, and Primers: 150 g/L.
    - c. Primers, Sealers, and Undercoaters: 200 g/L.

## **2.4 THERMAL BARRIER**

- A. Material Compatibility: Thermal barrier and primer or topcoat products shall be compatible with one another and with substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and laboratory analysis.
- B. Usage Limitation: Thermal barrier coatings may be applied only in exposure environments listed in thermal barrier assembly design selected. Coatings rated for interior exposures shall not be applied in exterior exposures.
- C. Spray-Applied Intumescent Thermal Barrier Coating: Manufacturer's standard factory-mixed formulated, multi-coat system of products complying with thermal barrier performance requirements.
  1. Primer for Interior Applications: Product selected from Intumescent thermal barrier manufacturer's list of acceptable primers or provided by manufacturer.

2. Intumescent Coating: Single or multiple component coating that when applied is a relatively thin, paint-like film but when exposed to fire forms a thick, puffy, inert, charred-surface protectant that thermally insulates spray polyurethane.
  3. Topcoat for Interior Applications: (If required by manufacturer/installer) Product selected from Intumescent thermal barrier manufacturer's list of acceptable topcoats or provided by manufacturer. Provide only as required by manufacturer for additional protection based on actual site conditions.
- D. Spray-Applied Cellulose Thermal Barrier Coating: Manufacturer's standard factory-mixed formulated, single-coat system of cellulosic coating fibers combined with a binder or liquid adhesive. Products shall comply with complying thermal barrier performance requirements.
1. Primer for Interior Applications (if required by manufacturer): Product selected from cellulose thermal barrier manufacturer's list of acceptable primers or provided by manufacturer.

## **2.5 AUXILLARY MATERIALS**

- A. Sprayed Foam Insulating Gap Filler:
1. Description: Low pressure, one-component, expanding, closed-cell polyurethane insulating foam gap filler; applied with professional hand-held dispensing gun; CFC and HCFC free.
  2. Performance Requirements: Class 1 Fire-Retardant per ASTM E 84.
  3. Manufacturers and Products:
    - a. BASF; Foam Sealant.
    - b. Dow Chemical Co.; Great Stuff Pro.
- B. Metal Angle at Firesafing (Required usage based on Mock-Up Review): 0.1875 in (4.8 mm) thick aluminum or galvanized steel angle.
- C. Precast Joint Materials: Provide one of the following options:
1. Manufacturer's recommendation.
  2. Additional backer rod. Refer to Division 07 Section "Joint Sealants".
  3. Release Tape: 0.006 in (0.15 mm) thick polyethylene tape, adhesive backed on one side, width as required.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to which thermal insulation will be applied, with Installer present, for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting Work within a particular area will be construed as acceptance of surface conditions.
1. If applying to cast-in-place concrete, do not proceed with installation until after minimum concrete curing period recommended by insulation manufacturer.

2. Ensure that the following conditions are met:
  - a. Surfaces are sound, dry, even, and free of oil, grease, dirt, excess mortar or other contaminants
  - b. Concrete surfaces are cured and dry, smooth without large voids, spalled areas or sharp protrusions.
3. Verify substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263 until substrate passes.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  1. Manufacturer's current Evaluation Service Report (ESR) as issued by International Code Council (ICC-ES) and written installation instructions.
  2. Accepted submittals.
  3. Contract Documents.
  4. Mock-Up Review and Approval.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall be clean, dust-free, dry and have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
  1. Ensure that penetrating work by other trades is in place and complete.
  2. Prepare surfaces by brushing, scrubbing, scraping, or grinding to remove loose mortar, dust, oil, grease, oxidation, mill scale and other contaminants which will affect adhesion of the spray polyurethane foam.
  3. Wipe down metal surfaces to remove release agents or other non-compatible coatings, using clean sponges or rags soaked in a solvent compatible with the spray polyurethane foam.
  4. Verify that precast anchors are in place.
- B. Protection from Spray Applied Materials:
  1. Mask and cover adjacent areas to protect from overspray.
  2. Ensure any required foam stop or back up material are in place to prevent overspray and achieve complete seal.
  3. Seal off existing ventilation equipment. Install temporary ducting and fans to ensure exhaust fumes. Provide for make-up air.
  4. Erect barriers, isolate area and post warning signs to advise non-protected personnel to avoid the spray area.

### **3.4 INSTALLATION OF INSULATION SYSTEMS**

- A. Sprayed Foam Insulating Gap Filler: Apply sprayed foam insulating gap filler within area indicated on drawings using professional hand-held dispensing gun in accordance with manufacturer's written instructions.
  - 1. Prior to installation of foam insulation, apply sprayed foam insulating gap filler to gaps, cracks, cavities, openings, and voids in substrate including annular space around piping, ducts, conduits, wiring, and electrical outlets to seal off potential air drafts.
  - 2. Apply sprayed foam insulating gap filler to window mullions after final application of sprayed materials, as indicated on drawings.
  - 3. After sprayed foam sealant is applied, make flush with face of adjacent wall by using method recommended by manufacturer.
- B. Termination Details (if required based on evaluation and approval of Mock-Up): Install metal angle at intersection of floor slab and precast concrete panels,
  - 1. Install metal angle above firesafing to provide a mechanically fastened edge restraint for the foam insulation. Fasten top leg of metal angle to backside of precast panel wall. Ensure bottom leg of metal angle covers entire area of firesafing. Fasten bottom leg of metal angle to concrete floor slab. Do not terminate foam insulation on firesafing. Fill any gaps between metal angle and firestop with sprayed foam insulating gap filler.
- C. Spray Application: Install materials in accordance with manufacturer's recommendations and the following:
  - 1. Equipment used shall comply with the manufacturer's recommendations for the specific type of application. Record equipment settings on the Daily Work Record as required by the submittals. Each proportioned unit shall supply only one spray gun.
  - 2. Apply only when surfaces and environmental conditions are within limits prescribed by the material manufacturer.
  - 3. Foam Insulation: Apply in consecutive passes as recommended by manufacturer to thickness as indicated on drawings. Passes shall be not less than 1/2 inch (12 mm) and not greater than 2 inches (50 mm). An additional pass shall only be done after the first pass has had time to cool down.
    - a. Apply material in thicknesses not less than those required to achieve minimum R-value indicated.
  - 4. Install within manufacturer's tolerances, but not more than minus 1/4 inch (6 mm) or plus 1/2 inch (12 mm).
  - 5. Do not install within 3 inches (75 mm) of heat emitting devices such as light fixtures.
  - 6. Finished surface of sprayed materials to be free of voids and embedded foreign objects.
  - 7. Trim, as required, any excess thickness that would interfere with the application of covering system by other trades.
  - 8. Cure sprayed materials according to manufacturer's recommendations to prevent premature drying.

### **3.5 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.

1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.
- B. Testing Agency: Employ and pay a qualified independent testing agency to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense.
  1. Thickness: Perform a minimum of one test for each 500 sf (150 sm) area, or partial area, per ASTM E 605.
  2. Density: Perform minimum of two tests per ASTM E 605.
  3. Bond Strength: Perform minimum of two cohesion and adhesion tests, per ASTM E 736.
  4. Shrinkage: Dimensional Stability laboratory testing of foam insulation.
  5. If testing finds applications of foam insulation material are not in compliance with requirements, perform additional random testing to determine extent of noncompliance.
  6. Remove and replace applications of foam insulation material where test results indicate that it does not comply with specified requirements for cohesion and adhesion and density.
  7. Apply additional material per manufacturer's written instructions where test results indicate that thickness does not comply with specified requirements.
  8. Patch areas where samples have been removed to maintain insulation thickness.
- C. Contractor Responsibilities:
  1. Proceed with application for next area only when test and inspection results for previously completed applications show compliance with specified requirements. Tested values must equal or exceed values required for each approved assembly design.
  2. Remove and replace applications where test and inspection results indicate it does not comply with specified requirements.
  3. Apply additional coatings where test and inspection results indicate application does not comply with specified requirements.
  4. Additional testing and inspecting will be performed to determine compliance of replaced or additional work with specified requirements at Contractor's expense.

### **3.6 PROTECTION AND CLEANING**

- A. Protection: Protect from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where installed product is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation
- B. Cleaning: Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction and acceptable to the primary material manufacturer.

**END OF SECTION**

## **SECTION 07 2400**

### **EIFS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Work required for this Section includes flexible thin coat (polymer-based; Class PB) exterior insulation and finish system (EIFS) and supplementary items necessary to complete their installation.

##### **1.2 DEFINITIONS**

- A. EIFS: Exterior Insulation and Finish System
- B. Class PB EIFS: As defined by ASTM C 1397 is a "nonload bearing, exterior wall cladding system that consists of an insulation board attached either adhesively, mechanically, or both to the substrate; an integrally reinforced base coat; and a texture protective finish coat."

##### **1.3 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.
  - 1. Obtain Shop Drawings of adjacent materials and products which penetrate surfaces of EIFS (i.e., windows, doors, etc.). Coordinate EIFS work with shop drawings of penetrating items.
- C. Samples for Verification: 24 in (600 mm) square panels for each type of finish-coat color and texture indicated, prepared using same tools and techniques intended for actual work including a typical control joint filled with sealant of color selected.

##### **1.4 INFORMATIONAL SUBMITTALS**

- A. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
  - 1. Product Approvals: Submit Florida Product Approval or Product Control Notice of Acceptance (NOA) issued by Miami-Dade County Building Code Compliance Office (BCCO) or other product approval acceptable to authorities having jurisdiction for systems used at exterior of building.
- B. Qualification Data:

1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
- C. Warranty: Sample of warranty.
1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.
- D. Compatibility and Adhesion Test Reports: From sealant manufacturer indicating that materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with joint sealants. Include joint sealant manufacturer's written interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.
- E. Research/Evaluation Reports: Evidence of EIFS compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.

## **1.5 MAINTENANCE MATERIAL SUBMITTALS**

- A. Maintenance Kit: Furnish maintenance kit to Owner to include the following:
1. Printed Maintenance Instructions.
  2. Adhesive: One gallon
  3. Base Coat Material: 1 gallon (3.8 L)
  4. Finish Coat Material: 1 gallon (3.8 L) for each color installed, from same batch as installed.
  5. Reinforcing Mesh: 20 sf (1.8 sq m)
  6. Insulation Board: 20 sf (1.8 sq m)

## **1.6 QUALITY ASSURANCE**

- A. Installer Qualifications:
1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
  3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.
- B. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
- C. Fire-Test-Response Characteristics: Provide EIFS assemblies and system components with fire-test-response characteristics as determined by testing identical assemblies and components per test method by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing and inspecting agency.
- D. Preconstruction Laboratory Testing: The Owner will employ and pay a qualified independent testing laboratory to perform the preconstruction testing indicated.

1. Construct mock-up units of the EIFS wall system for testing at the laboratory's test facilities.
  2. Mock-ups shall be complete with all components, finishes, and details of construction identical with those proposed for use in the building.
  3. Do not take special precautions or use techniques that do not represent those to be used on the building.
  4. Mock-ups shall be of sufficient size and configuration to demonstrate adequately the system's performance capabilities. Submit drawings of proposed mock-up to Architect prior to testing.
  5. Personnel assembling mock-ups at the laboratory shall be the personnel, to the extent possible, which will perform this work at the project site.
  6. Include EIFS, windows, doors, window wall if applicable, sealant joints and other conditions where EIFS abuts dissimilar materials.
  7. Schedule testing with sufficient time for analysis of results and to prevent delay in the progress of the Work.
  8. Test the EIFS wall system for compliance with requirements specified for performance and test methods.
  9. Test Mock-Up to failure and perform a "failure analysis" and subsequent report. Report shall be transmitted to the Owner, Architect, Contractor and EIFS Contractor.
- E. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.
1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.
    - a. Show typical components, attachments to building structure, and requirements of installation.
  2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
  3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
  4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
  5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

## **1.7 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.
1. Participants:
    - a. Architect.
    - b. Contractor, including superintendent.
    - c. Installer, including project manager and supervisor.
    - d. If requested, Manufacturer's qualified technical representative.
    - e. Installers of other construction interfaced with Work.

2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
  - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
  - b. Review Contract Document requirements.
  - c. Review approved submittals.
  - d. Review inspection and testing requirements.
  - e. Review environmental conditions and procedures for coping with unfavorable conditions.
  - f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
3. Record discussions, including decisions and agreements, and prepare report.

## **1.8 PROJECT CONDITIONS**

- A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.
- B. Environmental Limitations: Do not deliver, store or install system when ambient outdoor air and substrate temperatures are below or falling below minimum temperature recommended by system manufacturer unless temporary protection and heat are provided to maintain ambient temperatures above manufacturers minimum.

## **1.9 COORDINATION**

- A. Coordinate installation of EIFS with related Work specified in other Sections to ensure that wall assemblies, including sheathing, flashing, trim, joint sealers, windows, and doors, are protected against damage from the effects of weather, age, corrosion, moisture, and other causes. Do not allow water to penetrate behind EIFS and flashings.

## **1.10 WARRANTY**

- A. Manufacturer's Warranty: Furnish manufacturers written material and labor warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design of product. "Defects" are defined to include but not limited to deterioration or failure to perform as required.
  1. Coverage of warranty includes but is not limited to the following:
    - a. Material defects, including, but not limited to, peeling, cracking, delamination, flaking or similar failures.
    - b. Seepage and leakage of water or excessive moisture into the building or wall cavities through the System, EIFS to EIFS and EIFS to dissimilar sealant joints.
  2. Warranty Period: Manufacturer shall warrant the products to be free from material and labor Defects for a period of 10 years from date of Substantial Completion.

- B. Installer's Warranty: Furnish installer's written workmanship warranty signed by an authorized representative using installer's standard form agreeing to provide labor required to repair or replace work which exhibits workmanship defects. "Defects" is defined to include but not limited to deterioration or failure to perform as required.
  - 1. Warranty Period: Installer shall warrant the installation to be free from workmanship Defects for a period of 3 years from date of Substantial Completion
- C. Repair and replace defective work under the terms of the warranty at no cost to the Owner.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
- B. Available Manufacturers: Subject to compliance with requirements of Contract Documents as judged by the Architect, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those listed.
  - 1. Dryvit Systems, Inc.
  - 2. Omega Products International, Inc.
  - 3. Parex
  - 4. Senergy
  - 5. Sto Corp.
  - 6. TEIFS Wall Systems

### **2.2 PERFORMANCE REQUIREMENTS**

- A. General: Provide systems that comply with the following performance requirements:
  - 1. Bond Integrity: Free from bond failure within EIFS components or between system and supporting wall construction, resulting from exposure to fire, wind loads, weather, or other in-service conditions.
  - 2. Weathertightness: Resistant to water penetration from exterior into EIFS and assemblies behind it or through them into interior of building that results in deterioration of thermal-insulating effectiveness or other degradation of system and assemblies behind it, including substrates, supporting wall construction, and interior finish.
- B. Physical Properties: Provide Class PB EIFS whose physical properties and structural performance comply with the following when tested per methods referenced:
  - 1. Abrasion Resistance: Sample consisting of 1 in (25 mm) thick EIFS mounted on 1/2 in (12 mm) thick gypsum board; cured for a minimum of 28 days; and showing no cracking, checking, or loss of film integrity after exposure to 528 quarts of sand when tested per ASTM D 968, Method A.

2. Accelerated Weathering Characteristics: Sample of size suitable for test equipment and consisting of 1 in (25 mm) thick EIFS mounted on 1/2 in (12 mm) thick gypsum board; cured for 28 days; and showing no cracking, checking, crazing, erosion, blistering, peeling, or delamination after testing for 2000 hours when viewed under five times magnification per either ASTM G 23, Method 1 or ASTM G 53.
  3. Absorption-Freeze Resistance: No visible deleterious effects and negligible weight loss after 60 cycles per EIMA 101.01.
  4. Mildew Resistance: Sample consisting of finish coat applied to 2 in (50 mm) by 2 in (50 mm) clean glass substrate; cured for 28 days; and showing no growth when tested per ASTM D 3273.
  5. Salt-Spray Resistance: Sample consisting of 1 in (25 mm) thick EIFS mounted on 1/2 in (12 mm) thick gypsum board; cured for 28 days; and showing no cracking, checking, crazing, erosion, blistering, peeling, or delamination after testing for 300 hours per ASTM B 117.
  6. Tensile Adhesion: No failure in the adhesive, base coat, or finish coat. Minimum 5-psi tensile strength before and after freeze-thaw and accelerated weathering tests per EIMA 101.03.
  7. Water Penetration: Sample consisting of 1 in (25 mm) thick EIFS mounted on 1/2 in (12 mm) thick gypsum board; cured for 28 days; and showing no water penetration into the plane of the base coat to expanded polystyrene board interface of the test specimen after 15 minutes at 6.24 lbf/sq. ft. of air pressure difference or 20 percent of positive design wind pressure, whichever is greater, across the specimen during a test period when tested per EIMA 101.02.
  8. Impact Resistance: Sample consisting of 1 in (25 mm) thick EIFS when constructed, conditioned, and tested per EIMA 101.86; and meeting or exceeding the following impact classification and range:
    - a. Standard Impact Resistance: 25-49 inch-lb.
    - b. Medium Impact Resistance: 50-89 inch-lb.
    - c. High Impact Resistance: 90-150 inch-lb.
  9. Positive and Negative Wind-Load Performance: Sample assembly, 48 in (1200 mm) by 48 in (1200 mm) in size, consisting of studs, sheathing, and 1 in (25 mm) thick EIFS; and showing capability to withstand wind loads indicated when tested per ASTM E 330.
- C. Water-/Weather-Resistive-Barrier Coating: With physical properties that comply with the following when tested on substrate per methods referenced:
1. Tensile Adhesion: No failure in bond when 5 samples of water-/weather-resistive coating are applied to substrate and tested at a minimum 15-psi flatwise tensile strength per ASTM C 297.
  2. Absorption-Freeze Resistance: No visible deleterious effects and negligible weight loss after 60 cycles per EIMA 101.01.
  3. Water Penetration: 3 samples each sized not less than 4 ft (1.22 m) by 8 ft (2.4 m); consisting of coating applied to substrate including a minimum of 2 vertical joints and 1 horizontal joint within sheathing substrate, each joint not less than 0.125 in (3.11 mm) wide; and tested sequentially as follows:
    - a. Passing 10 cycles at 80 percent positive design load (design load is defined as ultimate load with a safety factor of 3.0 imposed) as the maximum test load when tested in accordance with ASTM E 1233, Procedure A.

- b. No water penetration on the plane of the exterior-facing side of substrate after 75 minutes at 6.24 lbf/sq. ft. of air-pressure difference or 20 percent of positive design wind pressure, whichever is greater, across the specimen during a test period when tested per ASTM E 331.
- 4. Water Resistance: 3 samples, each sized not less than 4 in (100 mm) by 6 in (150 mm) and consisting of coating applied to substrate, showing no cracking, checking, crazing, erosion, blistering, peeling, or delamination after testing for 14 days per ASTM D 2247.
- 5. Water Vapor Transmission: Three samples prepared by applying the coating, at recommended thickness, to a nonadhesive surface and removing cured coating film. Average thickness is determined from material density, area, and weight and samples are tested per ASTM E 96 after conditioning at 75 plus or minus 5 deg F and 50 percent relative humidity for 40 hours before testing, with results meeting or exceeding grade requirements in Table 14-1-A of UBC Standard 14-1.

## 2.3 MATERIALS

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials
- B. Compatibility: Provide waterproof membrane, adhesive, board insulation, reinforcing meshes, base- and finish-coat materials, sealants, and accessories that are compatible with one another and approved for use by EIFS manufacturer for Project.
- C. Colors, Textures, and Patterns of Finish Coat: Comply with the following requirements:
  - 1. Selections: As scheduled or as indicated in Design Selections.
- D. Waterproof Membrane and Air Barrier: Provide EIFS manufacturer's highly flexible, fiber reinforced, 100% acrylic polymer based, Portland cement modified waterproof protective coating designed to provide a waterproof, air and weather protective barrier for gypsum sheathing and other approved substrates.
- E. Adhesive for Application of Insulation: EIFS manufacturer's standard factory-mixed formulation, compatible with substrate and designed for adhesive attachment of insulation to substrates of type indicated.
- F. Molded-Polystyrene Board Insulation: Rigid, cellular thermal insulation formed by expansion of polystyrene resin beads or granules in a closed mold. Comply with EIFS manufacturer's requirements, ASTM C 578 for Type I, and "EIMA Guideline Specification for Expanded Polystyrene (EPS) Insulation Board" for more stringent requirements for material performance and qualities of insulation, including dimensions and permissible variations, and the following:
  - 1. Before cutting and shipping, age insulation in block form by air drying for not less than six weeks or by another method approved by EIMA that produces equivalent results.
  - 2. Provide insulation in boards not more than 24 in (600 mm) by 48 in (1200 mm) and in thickness indicated but not more than 4 in (100 mm) or less than that allowed by ASTM C 1397.
  - 3. Flame-Spread and Smoke-Developed Indexes of 25 and 450 or less, respectively, per ASTM E 84.

- G. Reinforcing Mesh: Balanced, alkali-resistant, open-weave glass-fiber mesh treated for compatibility with other EIFS materials, made from continuous multiend strands with retained mesh tensile strength of not less than 120 lbf/in. per EIMA 105.01, complying with ASTM D 578 and the following requirements for minimum weight:
  - 1. Standard Reinforcing Mesh: Not less than 4.0 oz./sq. yd.
  - 2. Intermediate Reinforcing Mesh: Not less than 10 oz./sq. yd.
  - 3. High-Impact-Resistant Reinforcing Mesh: Not less than 15 oz./sq. yd.
  - 4. Strip Reinforcing Mesh: Not less than 3.75 oz./sq. yd.
  - 5. Detail Reinforcing Mesh: Not less than 4 oz./sq. yd.
  - 6. Corner Reinforcing Mesh: Not less than 7.2 oz./sq. yd.
- H. Standard Base-Coat Materials: EIFS manufacturer's standard recommended factory-mixed or factory-blended formulation of portland cement, polymer admixture, and inert fillers
- I. Waterproof Base-Coat Materials: EIFS manufacturer's standard waterproof mixture of portland cement complying with ASTM C 150, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use indicated.
- J. Finish-Coat Materials: EIFS manufacturer's standard factory-mixed mildew resistant formulation of polymer-emulsion binder, colorfast mineral pigments, sound stone particles, and fillers
- K. Water: Potable.
- L. Flashing Transition Membrane: EIFS manufacturer's standard or product recommended in writing by EIFS manufacturer. One of the following:
  - 1. Flexible Membrane Flashing: Self-adhering, self-sealing rubberized asphalt and polyethylene film composite sheet or tape and primer.
  - 2. Fluid Applied Membrane Flashing: Flexible, water based polymer coating with embedded mesh reinforcement.
- M. Soffit Vent: Extruded aluminum soffit vent 2 in (50 mm) wide by continuous. Locate where indicated on drawings.

## **2.4 ELASTOMERIC SEALANTS**

- A. Elastomeric Sealant Products: Provide EIFS manufacturer's listed and recommended chemically curing, elastomeric sealant that is compatible with joint fillers, joint substrates, and other related materials, and complies with requirements for products and testing indicated in "EIMA Guide for Use of Sealants with Exterior Insulation and Finish Systems, Class PB" and with requirements in Division 07 Section "Joint Sealants" for products corresponding to description indicated below:
  - 1. Low-modulus silicone sealant.
- B. Sealant Color: As scheduled or as indicated in Design Selections.

## **2.5 MIXING**

- A. General: Comply with EIFS manufacturer's requirements for combining and mixing materials. Do not introduce admixtures, water, or other materials except as recommended by EIFS manufacturer. Mix materials in clean containers. Use materials within time period specified by EIFS manufacturer or discard.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer/fabricator's written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
- B. Protect contiguous work from moisture deterioration and soiling caused by application of EIFS. Provide temporary covering and other protection needed to prevent spattering of exterior finish coats on other work.
- C. Protect EIFS, substrates, and wall construction behind them from inclement weather during installation. Prevent penetration of moisture behind EIFS and deterioration of substrates.
- D. Prepare and clean substrates to comply with EIFS manufacturer's written requirements to obtain optimum bond between substrate and waterproof membrane.
  - 1. Verify vertical and horizontal board joints in sheathing, exposed edges at terminations, and inside and outside corners have been treated with 2 in (50 mm) glass fiber mesh tape.
  - 2. Trowel waterproofing membrane over sheathing board joints, inside and outside corners, exposed edges such as returns at wall openings and allow to dry.
  - 3. Trowel apply waterproofing mixture over the entire wall surface to a uniform thickness of approximately 3/32 in (0.08 m) and allow to completely dry.

4. Once waterproofing has completely dried apply flashing transition membrane at head, jamb and sill of all wall penetrations, top of parapet if applicable and changes in substrate.

### **3.4 INSTALLATION OF INSULATION**

- A. Comply with ASTM C 1397 and EIFS manufacturer's written instructions for installation of system as applicable to each type of substrate indicated.
- B. Treat exposed edges of insulation board at terminations and openings as follows:
  1. Wrap edges after installing insulation board and before applying field-applied reinforcing mesh.
  2. Wrap mesh of width required to extend not less than 2-1/2 in (62 mm) onto substrate behind insulation board, cover insulation board edge, and extend not less than 2-1/2 in (62 mm) onto insulation board face.
  3. Wrap edges of insulation board, except those forming substrates of sealant joints, by encapsulating with base coat, reinforcing mesh, and finish coat.
  4. Wrap edges of insulation board forming substrates of sealant joints within system or between system and other work by encapsulating with base coat and reinforcing mesh.
- C. Apply adhesive to insulation in a manner that results in full adhesive coating to back surface of insulation once insulation is adhered to waterproof membrane on sheathing.
- D. Press and slide insulation board into place. Apply pressure over the entire surface of the insulation board to accomplish uniform contact, high initial grab, and an overall level surface.
- E. Allow adhered insulation to remain undisturbed for period recommended by EIFS manufacturer, but not less than 24 hours, before beginning rasping and sanding insulation, or applying base coat and reinforcing mesh.
- F. Apply insulation boards over dry substrates in courses with long edges oriented horizontally. Begin first course from a level base line and work upward.
- G. Stagger vertical joints in successive courses to produce running bond pattern. Locate joints so no piece of insulation is less than 12 in (300 mm) wide or 6 in (150 mm) high. Offset joints not less than 6 in (150 mm) from corners of window and door openings.
  1. Offset joints of insulation not less than 6 in (150 mm) from horizontal and 4 in (100 mm) from vertical joints in sheathing.
  2. Offset joints of insulation not less than 4 in (100 mm) from aesthetic reveals.
  3. Interlock ends at internal and external corners.
- H. Abut boards tightly at joints within and between each course to produce flush, continuously even surfaces without gaps or raised edges between insulation boards. If gaps greater than 1/16 in (1.5 mm) occur, fill with insulation cut to fit gaps exactly; insert insulation without using adhesive or other material.
- I. Cut insulation to fit openings, corners, and projections precisely and to produce edges and shapes complying with details indicated. Install foam shapes attached to supporting substrate, where indicated.

- J. Rasp or sand flush entire surface of insulation to remove irregularities projecting more than 1/32 in (0.8 mm) from surface of insulation and to remove yellowed areas due to sun exposure; do not create depressions deeper than 1/16 in (1.5 mm).
- K. Cut aesthetic reveals in outside face of insulation with high-speed router and bit configured to produce grooves, rabbets, and other features that comply with profiles and locations indicated. Do not reduce insulation thickness at features to less than 3/4 in (19 mm).
- L. Form joints for sealant application by leaving gaps between adjoining insulation edges and between insulation edges and dissimilar adjoining surfaces. Make gaps wide enough to produce joint widths indicated after encapsulating joint substrates with base coat and reinforcing mesh.
  - 1. Interrupt insulation for expansion joints where indicated.
- M. Coordinate flashing installation with installation of insulation to produce a wall system that does not allow water to penetrate behind waterproof coating.

### **3.5 INSTALLATION OF FINISH SYSTEM**

- A. Apply base coat in two application's to exposed surfaces of insulation in minimum thickness recommended in writing by EIFS manufacturer, but not less than 1/16 in (1.5 mm) dry-coat total thickness.
- B. Embed reinforcing mesh of type and classification indicated below in wet base coat to produce wrinkle-free installation with mesh continuous at corners and overlapped not less than 2-1/2 in (62 mm) or otherwise treated at joints to comply with ASTM C 1397 and EIFS manufacturer's written requirements. Do not lap reinforcing mesh within 8 in (200 mm) of corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are not visible.
  - 1. Locations:
    - a. Standard Reinforcing Mesh: Typical unless noted or scheduled for a higher mesh.
    - b. Intermediate Reinforcing Mesh: Where indicated or required.
    - c. High-Impact-Resistant Reinforcing Mesh: Areas and facades exposed to abnormal stress or deliberate impacts including the following.
      - 1) Facades abutting grade or paved areas to 7 feet (2.1 m) above grade or to the first horizontal breakpoint above 7 feet (2.1 m).
      - 2) Balconies and/or terraces, full height.
      - 3) Freestanding columns, full height.
- C. Double-Layer Application: Where indicated, to obtain higher impact resistance apply second base coat and second layer of reinforcing mesh, in the same manner as first application. Do not apply until first base coat has cured.
- D. Additional Reinforcing Mesh: Apply strip reinforcing mesh around openings extending 4 in (100 mm) beyond perimeter. Apply additional 9 in (255 mm) by 12 in (300 mm) strip reinforcing mesh diagonally at corners of openings (re-entrant corners). Apply 8 in (200 mm) wide strip reinforcing mesh at both inside and outside corners, unless base layer of mesh is lapped not less than 4 in (100 mm) on each side of corners.

1. At aesthetic reveals, apply strip reinforcing mesh not less than 8 in (200 mm) wide.
  2. Embed strip reinforcing mesh in base coat before applying first layer of reinforcing mesh.
  3. Shapes: Fully embed reinforcing mesh in base coat.
- E. Apply finish coat over dry base coat, maintaining a wet edge at all times for uniform appearance, in thickness required by EIFS manufacturer to produce a uniform finish of color and texture matching approved sample and free of cold joints, shadow lines, and texture variations.

### **3.6 INSTALLATION OF JOINT SEALANTS**

- A. Prepare joints and apply sealants, of type and at locations indicated, to comply with applicable requirements in Division 07 Section "Joint Sealants" and in "EIMA Guide for Use of Sealants with Exterior Insulation and Finish Systems, Class PB."
1. Clean surfaces to receive sealants to comply with indicated requirements and EIFS manufacturer's written instructions.
  2. Apply primer recommended in writing by sealant manufacturer for surfaces to be sealed.
  3. Install sealant backing to control depth and configuration of sealant joint and to prevent sealant from adhering to back of joint.
  4. Apply masking tape to protect areas adjacent to sealant joints. Remove tape immediately after tooling joints, without disturbing joint seal.
  5. Apply joint sealants after base coat has cured but before applying finish coat.

### **3.7 CLEANING AND PROTECTING**

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

### **3.8 FINISH SCHEDULE**

- A. Color and Texture / Sealant Color: Match existing.

**END OF SECTION**

## **SECTION 07 2713**

### **SELF-ADHERING AIR AND WATER BARRIERS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Self-adhering, vapor permeable air and water barrier located within exterior wall assemblies; and supplementary items necessary for installation.
- B. Related Section:
  - 1. Refer to Division 6 Section "Exterior Gypsum Sheathing" for sheathing joint treatment. Joint treatment components to be compatible with air and water barrier system.
  - 2. Division 07 Section "EIFS" for air and water barrier that is a part of the EIFS wall assembly. Products specified in this "Air and Water Barrier" Section are not intended to be used with the EIFS wall assembly.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of products.
  - 2. Include data on air and water-vapor permanence based on testing according to referenced standards.
  - 3. Include VOC content of each material, and applicable legal limit in the jurisdiction of the project.
- B. Samples: Actual samples for each of following:
  - 1. Air and Water Barrier Membrane: Minimum 8-1/2 in by 11 in (212 mm) by (275 mm).
  - 2. Accessory Materials: Sample of each item.
- C. Shop Drawings: Show locations and extent of air and water barrier assemblies and details of typical conditions, intersections with other envelope assemblies and materials, membrane counter-flashings, bridging details for gaps in construction, inside and outside corners, attaching materials covering air and water barrier to maintain air-tight condition, sealing miscellaneous penetrations including conduits, pipes, electric boxes and similar items.
  - 1. Include statement that materials are compatible with adjacent materials proposed for use.
  - 2. Include recommended values for field adhesion test on each substrate.
- D. Shop Drawings of Mock-Up: Submit shop drawings of proposed mock-ups showing plans, elevations, large-scale details, and connections to the test apparatus.

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### **1.3 INFORMATIONAL SUBMITTALS**

- A. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
- B. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".
- C. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its products and systems are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.
- D. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information specified.
- E. Warranty: Sample of warranty.
  - 1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

### **1.4 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Installer Qualifications:
  - 1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  - 2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
  - 3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.
- C. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.
  - 1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.

- a. Build integrated mockups of exterior wall assembly, incorporating backup wall construction, external cladding, glazed aluminum framing, door frame and sill, insulation, ties and other penetrations, and flashing to demonstrate surface preparation, crack and joint treatment, application of air barriers, and sealing of gaps, terminations, and penetrations of air-barrier assembly.
  - b. If indicated, coordinate construction of mockups to permit inspection by Owner's testing agency of air barrier before external insulation and cladding are installed.
  - c. Include junction with roofing membrane, building corners and, foundations.
2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
  3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
  4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
  5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

#### **1.5 PRECONSTRUCTION TESTING FOR AIR LEAKAGE**

- A. Preconstruction Testing Service: Owner may engage a qualified testing agency to perform preconstruction testing on field mockups.
- B. Mockup Testing: Air-barrier assemblies shall comply with performance requirements indicated, as evidenced by reports based on mockup testing by a qualified testing agency.
  1. Quantitative Air-Leakage Testing: Mockups will be tested for air leakage according to ASTM E 783 or ASTM E 2357.
  2. Adhesion Testing: Mockups will be tested for minimum air-barrier adhesion of 16 lbf/sq. in. (110 kPa) according to ASTM D 4541.

#### **1.6 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.
  1. Participants:
    - a. Architect.
    - b. Contractor, including superintendent.
    - c. Installer, including project manager and supervisor.
    - d. Manufacturer's qualified technical representative.
    - e. Installers of other construction interfaced with Work.
  2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
    - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.

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- b. Review Contract Document requirements.
- c. Review approved submittals.
- d. Review inspection and testing requirements.
- e. Review environmental conditions and procedures for coping with unfavorable conditions.
- f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.

3. Record discussions, including decisions and agreements, and prepare report.

## **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver weather barrier materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.
- B. Store weather barrier materials as recommended by weather barrier manufacturer.

## **1.8 PROJECT CONDITIONS**

- A. Ambient Conditions: Install air and water barrier within range of ambient and substrate temperatures and moisture conditions as recommended by manufacturer. Protect substrates from environmental conditions that affect performance. Do not apply to a damp or wet substrate or during high humidity conditions including snow, rain, fog, or mist.

## **1.9 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **1.10 WARRANTY**

- A. Manufacturer's Warranty: Furnish manufacturer's written material and labor warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design of product. "Defects" are defined to include but not limited to deterioration or failure to perform as required.
  - 1. Warranty Period: Manufacturer shall warrant the products to be free from material and labor Defects for a period of 5 years from date of Substantial Completion
- B. Installer's Warranty: Furnish installer's written workmanship warranty signed by an authorized representative using installer's standard form agreeing to provide labor required to repair or replace work which exhibits workmanship defects. "Defects" is defined to include but not limited to deterioration or failure to perform as required.
  - 1. Warranty Period: Installer shall warrant the installation to be free from workmanship Defects for a period of 2 years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to Conditions of the Contract and Division 01 Section "Substitution Procedures".
1. GCP Applied Technologies, Inc.; Perm-A-Barrier VPS.
  2. VaproShield; Wrapshield SA Self-Adhered
- B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

### **2.3 PERFORMANCE REQUIREMENTS**

- A. General: Air barrier shall be capable of performing as a continuous air and water barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
1. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
  2. Air Leakage - Assemblies of Materials and Components: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. (0.2 L/s x sq. m of surface area at 75 Pa), when tested according to ASTM E 2357.
  3. Assembly shall perform as a drainage plane flashed to discharge condensation or water penetration to the exterior.
  4. Assembly shall accommodate movements of building materials by providing expansion and control joints as required, with accessory air and water seal materials at such locations, changes in substrate and perimeter conditions.
  5. Assembly shall be capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope without damage or displacement, and shall transfer the load to the structure.
  6. Assembly shall not displace adjacent materials under full load.

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7. Assembly shall be joined in an airtight and flexible manner to the air barrier material of adjacent assemblies, allowing for the relative movement of assemblies due to thermal and moisture variations and creep, and anticipated seismic movement.
- B. Connections to Adjacent Materials: Provide connections to prevent air leakage and water migration at the following locations:
1. Foundation and walls, including penetrations, ties and anchors
  2. Walls, windows, curtain walls, storefronts, louvers or doors.
  3. Different wall assemblies and fixed openings within those assemblies.
  4. Wall and roof connections.
  5. Floors over unconditioned space.
  6. Walls, floor and roof across construction, control and expansion joints.
  7. Walls, floors and roof to utility, pipe and duct penetrations.
  8. Seismic and expansion joints.
  9. Other leakage pathways in the building envelope.

## **2.4 SELF ADHERING AIR AND WATER BARRIER**

- A. Self-Adhering Air and Water Barrier: Self-adhering, vapor-permeable membrane composed of flexible facing material coated completely and uniformly on one side with adhesive material, formed into uniform, flexible sheets, interleaved with disposable release liner. Use regular or low-temperature formulation depending on site conditions within temperature ranges specified by manufacturer. Provide related accessories including primer, seam tape, mastic, fluid and sealant recommended by manufacturer and formulated to comply with VOC limits.
1. Basis of Design: GPC Applied Technologies, Inc.; Perm-A-Barrier VPS.
  2. Ancillary Items by Manufacturer:
    - a. Water-Based Primer: Perm-A-Barrier Primer Plus.
    - b. Foil Faced Barrier Flashing Tape: Perm-A-Barrier Aluminum Flashing.
    - c. Through-Wall Flashing: Perm-A-Barrier Wall Flashing.
    - d. Liquid Detail Membrane and Substrate Patching Membrane: Bituthene Liquid Membrane.
    - e. Mastic: Bituthene Mastic.
    - f. Adhesives, Tapes and Sealants: As recommended by manufacturer.
  3. Physical and Performance Properties:
    - a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. (0.02 L/s x sq. m of surface area at 75-Pa) pressure difference; ASTM E 2178.
    - b. Vapor Permeance: 10 perms (580 ng/Pa x s x sq. m) minimum; ASTM E 96/E 96M, Water Method.

## **2.5 ACCESSORY MATERIALS**

- A. General: Accessory materials recommended by air-barrier manufacturer to produce a complete air-barrier assembly and compatible with primary air-barrier membrane.

- B. Primer: Liquid primer recommended for substrate by air-barrier material manufacturer.
- C. Termination Mastic: Air-barrier manufacturer's standard cold fluid-applied elastomeric liquid; trowel grade.
- D. Substrate-Patching Membrane: Manufacturer's standard trowel-grade substrate filler.
- E. Adhesive and Tape: Air-barrier manufacturer's standard adhesive and pressure-sensitive adhesive tape.
- F. Termination Bars:
  - 1. Bar: 1/8 in (3 mm) thick by 1 in (25 mm) wide continuous stainless steel bar with 1/4 in (6 mm) diameter holes spaced at 8 in (200 mm) on centers.
  - 2. Mechanical Fasteners: Corrosion resistant, self-tapping drill point screws with hex washer head with bonded EPDM, shank size and length as required to penetrate steel stud flange and strap back-up by not less than 3 exposed threads.
- G. One-Piece Electrical Box:
  - 1. Description: Rigid reinforced polyethylene electrical box designed to prevent leaks at air and water barrier, with fixed or adjustable flange to suit installation conditions, with clear hinged weatherproof in-use cover.
  - 2. Manufacturer and Product: Arlington Industries, Inc.; In Box.
- H. Sheathing Joint Treatments: Refer to Division 6 Section "Exterior Gypsum Sheathing". All components to be compatible with air and water barrier system.
- I. Joint Sealant: Silicone construction sealant as specified in Division 07 Section "Joint Sealants".

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting Work within a particular area will be construed as acceptance of surface conditions.
  - 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
  - 2. Verify that concrete has cured and aged for minimum time period recommended by air-barrier manufacturer.
  - 3. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
  - 4. Verify that masonry joints are flush and completely filled with mortar.
  - 5. Verify sealants and joint treatments used in sheathing are compatible with membrane.

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### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer's written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
- B. Clean, prepare, and treat substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air-barrier application.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- E. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.
- F. Bridge and cover isolation joints, expansion joints and discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with overlapping membrane strips.
- G. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- H. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

### **3.4 AIR AND WATER BARRIER INSTALLATION**

- A. General: Install air and water barrier sheets and accessory materials according to air-barrier manufacturer's written instructions.
- B. One-Piece Electrical Box: Install in accordance with manufacturer's recommendations. Cover shall project from face of wall surface enough to allow hinged cover to fully open for access.
- C. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.

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1. Install modified bituminous strips centered over vertical inside corners. Install 3/4 in (19 mm) fillets of termination mastic on horizontal inside corners.
- D. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations with termination mastic and according to ASTM D 6135.
- E. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier sheet on same day. Reprime areas exposed for more than 24 hours.
1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.
- F. Apply and firmly adhere modified bituminous sheets horizontally over area to receive air barrier. Accurately align sheets and maintain uniform 2-1/2 in (62 mm) minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure airtight installation.
1. Apply sheets in a shingled manner to shed water without interception by any exposed sheet edges.
  2. Roll sheets firmly to enhance adhesion to substrate.
- G. Apply continuous sheets over strips bridging substrate cracks, construction, and contraction joints.
- H. CMU: Install air-barrier sheet horizontally against the CMU beginning at base of wall. Align top edge of air-barrier sheet immediately below protruding masonry ties or joint reinforcement or ties, and firmly adhere in place.
1. Overlap horizontally adjacent sheets a minimum of 2 in (50 mm) and roll seams.
  2. Apply overlapping sheets with bottom edge slit to fit around masonry reinforcing or ties. Roll firmly into place.
  3. Seal masonry reinforcing or ties and penetrations.
  4. Continue the membrane into all openings in the wall, such as doors and windows, and terminate at points to maintain an airtight barrier that is not visible from interior.
- I. Seal exposed edges of sheet at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination sealant.
1. Cladding Anchors: Apply 4 in (100 mm) by 7 in (175 mm) flashing tape to weather barrier membrane prior to the installation of cladding anchors.
- J. Install air-barrier sheet and accessory materials to form a seal with adjacent construction and to maintain a continuous air barrier.
1. Coordinate air-barrier installation with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
  2. Install strip on roofing membrane or base flashing so that a minimum of 3 in (75 mm) of coverage is achieved over each substrate.

- K. Connect and seal exterior wall air-barrier membrane continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
- L. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip or flashing sheet as indicated so that a minimum of 3 in (75 mm) of coverage is achieved over each substrate. Maintain 3 in (75 mm) of full contact over firm bearing to perimeter frames with not less than 1 in (25 mm) of full contact.
- M. One-Piece Electrical Box: Install in accordance with manufacturer's recommendations. Cover shall project from face of wall surface enough to allow hinged cover to fully open for access.
- N. At end of each working day, seal top edge of air-barrier material to substrate with termination mastic.
- O. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- P. Repair punctures, voids, and deficient lapped seams in air barrier. Slit and flatten fishmouths and blisters. Patch with air-barrier sheet extending 6 in (150 mm) beyond repaired areas in all directions.

### **3.5 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.
  - 1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.
- B. Testing Agency: The Owner may employ and pay a qualified independent testing agency to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense.
- C. Testing Agency: Employ and pay a qualified independent testing agency to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense.
- D. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:

1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
2. Continuous structural support of air-barrier system has been provided.
3. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.
4. Site conditions for application temperature and dryness of substrates have been maintained.
5. Maximum exposure time of materials to UV deterioration has not been exceeded.
6. Surfaces have been primed.
7. Laps in sheet materials have complied with the minimum requirements and have been shingled in the correct direction (or mastic applied on exposed edges), with no fishmouths.
8. Termination mastic has been applied on cut edges.
9. Air barrier has been firmly adhered to substrate.
10. Compatible materials have been used.
11. Transitions at changes in direction and structural support at gaps have been provided.
12. Connections between assemblies (membrane and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
13. All penetrations have been sealed.

E. Tests: As determined by Owner's testing agency from among the following tests:

1. Quantitative Air-Leakage Testing: Air-barrier assemblies will be tested for air leakage according to ASTM E 783.
2. Adhesion Testing: Air-barrier assemblies will be tested for minimum air-barrier adhesion of 16 lbf/sq. in. (110 kPa) according to ASTM D 4541.
3. Refer to Division 01 Section "Field Test for Water Leakage".

F. Air barriers will be considered defective if they do not pass tests and inspections.

1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
2. Remove and replace deficient air-barrier components for retesting as specified above.

G. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

### **3.6 CLEANING AND PROTECTION**

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

1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer.
2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

- B. Clean spills, stains, and soiling from construction that would be exposed in the completed Work, using cleaning agents and procedures recommended by manufacturer of affected construction.

**END OF SECTION**

**17-13 OSU, College of Osteopathic Medicine at  
Cherokee Nation  
Childers Architect  
2019-07-26**

**SELF-  
ADHERING AIR  
AND  
WATER  
BARRIERS**

Refer to IECC for Climate Zones.

## **SECTION 072726**

### **FLUID-APPLIED AIR AND WATER BARRIERS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Fluid applied air and water barriers located within exterior wall assemblies; and supplementary items necessary for installation.
  - 1. Fluid applied air and water barrier - vapor permeable.
- B. Related Sections:
  - 1. Refer to Division 6 Section Exterior Gypsum Sheathing for wall sheathing and sheathing joint-and-penetration treatments. Joint treatment components shall be compatible with air and water barrier assembly.
  - 2. Division 07 Section "EIFS" for air and water barrier that is a part of the EIFS wall assembly. Products specified in this "Air and Water Barrier" Section are not intended to be used with the EIFS wall assembly.

##### **1.2 DEFINITIONS**

- A. Air and Water Barrier Material: A primary element that provides a continuous barrier to the movement of air.
- B. Air and Water Barrier Accessory: A transitional component of the air barrier that provides continuity.
- C. Air and Water Barrier Assembly: The collection of air and water barrier materials and accessory materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.
- D. Air-Barrier System: The combination of air-barrier assemblies installed to provide a continuous barrier to the movement of air through building enclosures. This term applies to the whole building.

##### **1.3 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.

1. Include manufacturer's written instructions for evaluating, preparing, and treating each substrate; technical data; dry film thickness; and tested physical and performance properties of products.
  2. Include data on air and water-vapor permanence based on testing according to referenced standards.
  3. Include VOC content of each material, and applicable legal limit in the jurisdiction of the project.
- B. Samples: Samples for each of following:
1. Air and Water Barrier Membrane: Minimum 8-1/2 in by 11 in (212 mm) by (275 mm).
  2. Accessory Materials: Sample of each item.
- C. Shop Drawings: For air and water barrier assemblies.
1. Show locations and extent of air and water barrier assemblies and details of typical and project specific conditions.
    - a. Include recommended values for field adhesion test on each substrate.
  2. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
  3. Include details of interfaces with other materials that form part of air barrier.
- D. Shop Drawings of Mock-Up: Submit shop drawings of proposed mock-ups showing plans, elevations, large-scale details, and connections to the test apparatus.

#### **1.4 INFORMATIONAL SUBMITTALS**

- A. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its products and systems are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.
1. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with the barrier.
- B. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".
- C. Warranty:

1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

## **1.5 QUALITY ASSURANCE**

### **A. Installer Qualifications:**

1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.

### **B. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.**

1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.
  - a. Build integrated mockups of exterior wall assembly, incorporating backup wall construction, external cladding, glazed aluminum framing, door frame and sill, insulation, ties and other penetrations, and flashing to demonstrate surface preparation, crack and joint treatment, application of air and water barriers, and sealing of gaps, terminations, and penetrations of air and water barrier assembly.
  - b. If indicated, coordinate construction of mockups to permit inspection by Owner's testing agency of air and water barrier before external insulation and cladding are installed.
  - c. Include junction with roofing membrane, building corners and, foundations.
2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

## **1.6 PRECONSTRUCTION TESTING**

- A. Preconstruction Testing Service: Owner may engage a qualified testing agency to perform preconstruction testing on field mockups
- B. Mockup Testing: Air-barrier assemblies shall comply with performance requirements indicated, as evidenced by reports based on mockup testing by a qualified testing agency
  - 1. Air Leakage Volume Testing - Assembly: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. (0.2 L/s x sq. m of surface area at 75 Pa), when tested according to ASTM E 783 or ASTM E 2357.
  - 2. Adhesion Testing: Minimum 30 lbf/sq. in. (207 kPa) when tested according to ASTM D 4541 for adhesion to concrete.

## **1.7 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.
  - 1. Participants:
    - a. Architect.
    - b. Contractor, including superintendent.
    - c. Installer, including project manager and supervisor.
    - d. Manufacturer's qualified technical representative.
    - e. Installers of other construction interfaced with Work.
  - 2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
    - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
    - b. Review Contract Document requirements.
    - c. Review approved submittals.
    - d. Review inspection and testing requirements.
    - e. Review environmental conditions and procedures for coping with unfavorable conditions.
    - f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
  - 3. Record discussions, including decisions and agreements, and prepare report.

## **1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials in manufacturers original, unopened, undamaged containers with identification labels intact.
- B. Store materials as recommended by manufacturer.

## **1.9 PROJECT CONDITIONS**

- A. Environmental Limitations: Apply air and water barrier within the range of ambient and substrate temperatures recommended by air and water barrier manufacturer.
  - 1. Protect substrates from environmental conditions that affect air and water barrier performance.
  - 2. Do not apply air and water barrier to a damp or wet substrate or during snow, rain, fog, or mist.

## **1.10 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **1.11 WARRANTY**

- A. Manufacturer's Warranty: Furnish manufacturer's written material and labor warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design of product. "Defects" are defined to include but not limited to deterioration or failure to perform as required.
  - 1. Warranty Period: Manufacturer shall warrant the products to be free from material and labor Defects for a period of 10 years from date of Substantial Completion.
- B. Installer's Warranty: Furnish installer's written workmanship warranty signed by an authorized representative using installer's standard form agreeing to provide labor required to repair or replace work which exhibits workmanship defects. "Defects" is defined to include but not limited to deterioration or failure to perform as required.
  - 1. Warranty Period: Installer shall warrant the installation to be free from workmanship Defects for a period of 2 years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to Conditions of the Contract and Division 01 Section "Substitution Procedures".

### **2.2 MATERIALS, GENERAL**

- A. Source Limitations: Obtain primary air and water barrier materials and air and water barrier accessories from single source from single manufacturer.

### **2.3 PERFORMANCE REQUIREMENTS**

- A. General: Air and water barrier assembly and seals with adjacent construction shall be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior. Air and water barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to embedded flashing, tie-ins to installed waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
  - 1. Assembly shall perform as a drainage plane flashed to discharge condensation or water penetration to the exterior.
  - 2. Assembly shall accommodate movements of building materials by providing expansion and control joints as required, with accessory air and water seal materials at such locations, changes in substrate and perimeter conditions.
  - 3. Assembly shall be capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope without damage or displacement and shall transfer the load to the structure.
  - 4. Assembly shall not displace adjacent materials under full load.
  - 5. Assembly shall be joined in an airtight and flexible manner to the air and water barrier material of adjacent assemblies, allowing for the relative movement of assemblies due to thermal and moisture variations and creep, and anticipated seismic movement.
- B. Connections to Adjacent Materials: Provide connections to prevent air leakage and water migration at the following locations:
  - 1. Foundation and walls, including penetrations, ties and anchors
  - 2. Walls, windows, curtain walls, storefronts, louvers or doors.
  - 3. Different wall assemblies and fixed openings within those assemblies.
  - 4. Wall and roof connections.
  - 5. Floors over unconditioned space.

6. Walls, floor and roof across construction, control and expansion joints.
7. Walls, floors and roof to utility, pipe and duct penetrations.
8. Seismic and expansion joints.
9. Other leakage pathways in the building envelope.

- C. Air-Barrier Air Leakage - Assembly: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. (0.2 L/s x sq. m of surface area at 75 Pa), when tested according to ASTM E 2357.

## **2.4 FLUID APPLIED MEMBRANE AIR AND WATER BARRIER –Ó VAPOR PERMEABLE**

- A. Vapor-Permeable Air and Water Barrier: Liquid membrane with an installed dry film thickness according to manufacturer's written instructions, over smooth, void-free substrates.

### **1. Silicone Type:**

- a. Dow Corning; DefendAir 200 Silicone Liquid Applied Air and Water Barrier System.
  - 1) Required Film Thickness: 30-32 mils wet film thickness, 15 mils required dry film thickness.
- b. Momentive Performance Materials, Inc. / GE Silicones; Elemax 2600 Air and Water Barrier System.
  - 1) Required Film Thickness: 19 mils wet film thickness, 17 mils required dry film thickness.

### **2. Synthetic Acrylic Polymer Type:**

- a. Tremco Commercial Sealants and Waterproofing; EXOAIR 230 Permeable Air and Water Barrier Membrane System.
  - 1) Required Film Thickness: 48 mils wet film thickness, 25 mils required dry film thickness

### **3. Physical and Performance Properties:**

- a. Air Permeance - Materials: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. (0.02 L/s x sq. m of surface area at 75-Pa) pressure difference; ASTM E 2178.
- b. Vapor Permeance: 10 perms (580 ng/Pa x s x sq. m) minimum; ASTM E 96/E 96M, Water Method.
- c. Ultimate Elongation: Minimum 500 percent; ASTM D 412.
- d. Adhesion to Substrate: Minimum 30 lbf/sq. in. (207 kPa) when tested according to ASTM D 4541 for adhesion to concrete.

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

## **2.5 ACCESSORY MATERIALS**

- A. General: Provide compatible accessory materials recommended by air and water barrier manufacturer to produce a complete air and water barrier assembly.
  - 1. Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air and water barrier manufacturer to produce a complete air and water barrier assembly and that are compatible with primary air and water barrier material and adjacent construction to which they may seal.
- B. Primer: Liquid primer recommended for substrate by air-barrier material manufacturer
- C. Stainless-Steel Sheet: ASTM A240/A240M, Type 304, 0.0250 inch (0.64 mm) thick, and Series 300 stainless-steel fasteners.
- D. Preformed Silicone Extrusion: Manufacturer's standard system consisting of cured low-modulus silicone extrusion, sized to fit opening widths, with a single-component, neutral-curing, Class 100/50 (low-modulus) silicone sealant for bonding extrusions to substrates.
- E. Barrier Sealing Tape: Sheet material laminated to adhesive coated butyl or other barrier sealing tape approved by air and water barrier manufacturer for sealing fastener and anchor penetrations.
- F. Termination Bars:
  - 1. Bar: 1/8 in (3 mm) thick by 1 in (25 mm) wide continuous stainless-steel bar with 1/4 in (6 mm) diameter holes spaced at 8 in (200 mm) on centers.
  - 2. Mechanical Fasteners: Corrosion resistant, self-tapping drill point screws with hex washer head with bonded EPDM, shank size and length as required to penetrate steel stud flange and strap back-up by not less than 3 exposed threads.
- G. One-Piece Electrical Box:
  - 1. Description: Rigid reinforced polyethylene electrical box designed to prevent leaks at air and water barrier, with fixed or adjustable flange to suit installation conditions, with clear hinged weatherproof in-use cover.
  - 2. Manufacturer and Product: Arlington Industries, Inc.; In Box.

- H. Sheathing Joint Treatments: Refer to Division 6 Section "Exterior Gypsum Sheathing". All components to be compatible with air and water barrier system.
- I. Sealant: Silicone construction sealant as recommended by air and water barrier manufacturer for each installation condition.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.
  - 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
  - 2. Verify that substrates have cured and aged for minimum time period recommended by air and water barrier manufacturer.
  - 3. Verify that substrates are visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
  - 4. Verify that masonry joints are flush and filled completely with mortar.
  - 5. Verify sealants and joint treatments used in sheathing are compatible with membrane.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective Manufacturer's written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
- B. Clean, prepare, and treat substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air and water barrier application.

- C. Mask off adjoining surfaces not covered by air and water barrier to prevent spillage and overspray affecting other construction.
- D. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- E. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching membrane.
- F. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- G. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- H. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another to provide continuous support for air and water barrier.
- I. Bridge joints and discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer's written instructions and details.
- J. Masonry joints shall be struck flush and cracks greater than crack bridging ability shall be filled (routed and filled where necessary) prior to application of membrane to the surface.
- K. Sheathing joints shall be treated in accordance with manufacturer installation details.
  - 1. Treat and seal all screw penetrations. Allow treatment to cure before installation of air and water barrier membrane.

### **3.4 ACCESSORIES INSTALLATION**

- A. Install accessory materials according to air and water barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.
  - 1. Coordinate the installation of air and water barrier with installation of roofing membrane and base flashing to ensure continuity of air and water barrier with roofing membrane.
  - 2. Install transition strip on roofing membrane or base flashing so that a minimum of 3 inches (75 mm) of coverage is achieved over each substrate.
  - 3. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
  - 4. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air and water barrier material on same day. Re-prime areas exposed for more than 24 hours.

- B. Connect and seal exterior wall air and water barrier material continuously to roofing-membrane air and water barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
- C. One-Piece Electrical Box: Install in accordance with manufacturer's recommendations. Cover shall project from face of wall surface enough to allow hinged cover to fully open for access.
- D. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.
- E. Apply joint sealants forming part of air and water barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- F. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip or preformed silicone extrusion so that a minimum of 3 inches (75 mm) of coverage is achieved over each substrate. Maintain 3 inches (75 mm) of full contact over firm bearing to perimeter frames, with not less than 1 inch (25 mm) of full contact.
  - 1. Transition Strip: Roll firmly to enhance adhesion.
  - 2. Preformed Silicone Extrusion: Set in full bed of silicone sealant applied to walls, frame, and air and water barrier material. Roll firmly to enhance adhesion.
- G. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air and water barrier material with foam sealant.
- H. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic
- I. Seal top of through-wall flashings to air barrier with an additional 6-inch- (150-mm-) wide, transition strip.
- J. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counter-flashings or ending in reglets with termination mastic
- K. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fish mouths and blisters. Patch with transition strips extending 6 inches (150 mm) beyond repaired areas in strip direction
- L. Anchors and Fasteners: Install a strip of barrier flashing tape behind through-wall attachments, including masonry veneer anchors, that penetrate air and water barrier.

### **3.5 AIR AND WATER BARRIER MEMBRANE INSTALLATION**

- A. Apply air and water barrier material to form a seal with strips and transition strips and to achieve a continuous air and water barrier according to air and water barrier manufacturer's written instructions and details. Apply air and water barrier material within manufacturer's recommended application temperature ranges.
  - 1. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
  - 2. Limit priming to areas that will be covered by air and water barrier material on same day. Re-prime areas exposed for more than 24 hours.
  - 3. Where multiple prime coats are needed to achieve required bond, allow adequate drying time between coats.
- B. Apply continuous unbroken air-barrier material to substrates according to the following thickness. Apply an increased thickness of air-barrier material in full contact around protrusions such as masonry ties
  - 1. Total dry film thickness as recommended in writing by manufacturer to comply with performance requirements, applied in one or more equal coats. Apply additional material as needed to achieve void- and pinhole-free surface, but do not exceed thickness on which required vapor permeability is based
- C. Transition and Detailing Treatment: Install appropriate materials to treat sheathing joints, expansion joints, drift joints, rough openings, transitions, terminations, penetrations and similar surface irregularities. Transitions and detailing can be performed before or after air and water barrier membrane application. Ensure installation is performed in accordance with manufacturers written installation instructions and details.
- D. Do not cover air and water barrier until it has been tested and inspected by Owner's testing agency.
- E. Correct deficiencies in or remove air and water barrier that does not comply with requirements; repair substrates and reapply air and water barrier components.

### **3.6 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.

1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.
- B. Testing Agency: The Owner may employ and pay a qualified independent testing agency to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense.
- C. Inspections: Air and water barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:
1. Continuity of air and water barrier system has been achieved throughout the building envelope with no gaps or holes.
  2. Air and water barrier dry film thickness.
  3. Continuous structural support of air and water barrier system has been provided.
  4. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.
  5. Site conditions for application temperature and dryness of substrates have been maintained.
  6. Maximum exposure time of materials to UV deterioration has not been exceeded.
  7. Surfaces have been primed, if applicable.
  8. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fish mouths.
  9. Liquid flashing has been applied on cut edges.
  10. Strips and transition strips have been firmly adhered to substrate.
  11. Compatible materials have been used.
  12. Transitions at changes in direction and structural support at gaps have been provided.
  13. Connections between assemblies (air and water barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
  14. All penetrations have been sealed.
- D. Tests: As determined by Owner's testing agency from among the following tests:
1. Air Leakage Volume Testing - Assembly: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. (0.2 L/s x sq. m of surface area at 75 Pa), when tested according to ASTM E 783 or ASTM E 2357.
  2. Air Leakage Volume Testing - Building: Maximum 0.4 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. (2.0 L/s x sq. m of surface area at 75 Pa), when tested according to ASTM E 779.
  3. Adhesion Testing: Minimum 30 lbf/sq. in. (207 kPa) when tested according to ASTM D 4541 for adhesion to concrete.
  4. Refer to Division 01 Section "Field Test for Water Leakage".

- E. Air and water barriers will be considered defective if they do not pass tests and inspections.
  - 1. Apply additional air and water barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
  - 2. Remove and replace deficient air and water barrier components for retesting as specified above.
- F. Repair damage to air and water barriers caused by testing; follow manufacturer's written instructions.
- G. Prepare test and inspection reports.

### **3.7 CLEANING AND PROTECTION**

- A. Protect air and water barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
  - 1. Protect air and water barrier from exposure to UV light and harmful weather exposure as required by manufacturer.
  - 2. Protect air and water barrier from contact with incompatible materials and sealants not approved by air and water barrier manufacturer.
- B. Clean spills, stains, and soiling from construction that would be exposed in the completed Work, using cleaning agents and procedures recommended by manufacturer of affected construction.
- C. Remove masking materials after installation.

### **END OF SECTION**

## **SECTION 07 4213**

### **FORMED METAL WALL PANELS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Factory-formed metal wall panels and supplementary items necessary for installation.

##### **1.2 DEFINITIONS**

- A. Metal Wall Panel Assembly: Metal wall panels, attachment system components, miscellaneous metal framing, and supplementary items necessary for a complete weathertight wall system.

##### **1.3 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work. Include the following:
  - 1. Show fabrication and installation layouts of metal wall panels.
  - 2. Show details and locations of edge conditions, side-seam and end-lap joints, panel profiles, corners, anchorages, trim, flashings, closures, and terminations.
  - 3. Show details for securing metal wall panel assembly, including layout of fasteners and other attachments.
  - 4. Show details of wall panel penetrations.
  - 5. Show details of connections to adjoining work.
  - 6. Indicate where and how the system deviates from Contract Documents.
- C. Samples for Verification Purposes: For each type of exposed finish required, prepared on samples of size indicated below.
  - 1. Metal Wall Panels: 12 in (300 mm) long by actual panel width. Include fasteners, closures, and other metal wall panel accessories.
  - 2. Trim and Closures: 12 in (300 mm) long. Include fasteners and other exposed accessories.
  - 3. Accessories: 12 in (300 mm) long samples for each type of accessory.

#### **1.4 INFORMATIONAL SUBMITTALS**

- A. Delegated Engineering Calculations: Informational submittal for products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation; test reports are not acceptable substitute for calculations.
- B. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
  - 1. Product Approvals: Submit Florida Product Approval or Product Control Notice of Acceptance (NOA) issued by Miami-Dade County Building Code Compliance Office (BCCO) or other product approval acceptable to authorities having jurisdiction for systems used at exterior of building.
- C. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".
- D. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its products and systems are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.
- E. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
- F. Warranty: Sample of warranty.
  - 1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

#### **1.5 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: To include in maintenance manuals.

#### **1.6 QUALITY ASSURANCE**

- A. Installer Qualifications:
  - 1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  - 2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
  - 3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.

- B. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.
1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.
    - a. Show typical components, attachments to building structure, and requirements of installation.
  2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
  3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
  4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
  5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

#### **1.7 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.
1. Participants:
    - a. Architect.
    - b. Contractor, including superintendent.
    - c. Installer, including project manager and supervisor.
    - d. If requested, Manufacturer's qualified technical representative.
    - e. Installers of other construction interfaced with Work.
  2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
    - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
    - b. Review Contract Document requirements.
    - c. Review approved submittals.
    - d. Review inspection and testing requirements.
    - e. Review environmental conditions and procedures for coping with unfavorable conditions.
    - f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
  3. Record discussions, including decisions and agreements, and prepare report.

## **1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver components, sheets, metal wall panels, and other manufactured items so as not to be damaged or deformed. Package metal wall panels for protection during transportation and handling.
- B. Unload, store, and erect metal wall panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal wall panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal wall panels to ensure dryness, with positive slope for drainage of water. Do not store metal wall panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal wall panel for period of metal wall panel installation.

## **1.9 PROJECT CONDITIONS**

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal wall panels to be performed according to manufacturer's written instructions and warranty requirements.
- B. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

## **1.10 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **1.11 WARRANTY**

- A. Manufacturer's Warranty: Furnish manufacturer's written material and labor warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design and installation of product. "Defects" is defined to include but not limited to deterioration or failure to perform as required.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including, but not limited to, excessive deflection.
    - b. Noise or vibration created by wind and thermal and structural movements.
    - c. Deterioration of metals and other materials beyond normal weathering.
    - d. Water penetration through fixed panels.
  - 2. Warranty Period: Manufacturer shall warrant the products to be free from material and labor Defects for a period of 5 years from date of Substantial Completion

- B. Installer's Warranty: Furnish installer's written workmanship warranty signed by an authorized representative using installer's standard form agreeing to provide labor required to repair or replace work which exhibits workmanship defects. "Defects" is defined to include but not limited to deterioration or failure to perform as required.
  - 1. Warranty Period: Installer shall warrant the installation to be free from workmanship Defects for a period of 2 years from date of Substantial Completion.
- C. Factory Applied Finish Warranty for High-Performance Fluoropolymer Finishes: Furnish manufacturer's written warranty signed by an authorized representative using manufacturer's standard form agreeing to repair finish or replace work which exhibits finish defects. "Defects" is defined to include but not limited to deterioration or failure of finish to perform as required.
  - 1. Coverage includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  - 2. Warranty Period: Manufacturer shall warrant the installation to be free from finish defects for a period of 20 years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
  - 1. Architectural Building Components.
  - 2. Berridge Manufacturing Company.
  - 3. CENTRIA Architectural Systems.
  - 4. MBCI
- B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

### **2.3 PERFORMANCE REQUIREMENTS**

- A. General Performance: Engineer products and systems to withstand loads within limits of allowable working stresses of the materials involved under conditions indicated and without permanent deformation or failure of materials.

- B. Design Loads: Engineer to withstand design loads including, but not limited to, gravity, wind, seismic, and erection design loads and thermal movements established by authorities having jurisdiction, applicable local building codes and as indicated.
  - 1. Structural Movement: Engineer to withstand movements of structure including, but not limited to, drift, twist, column shortening, long-term creep and deflection from uniformly distributed and concentrated live loads. Contractor shall obtain required design data and identify movements accommodated on submittal drawings.
- C. Delegated Design: Design metal wall panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- D. Structural-Test Performance: Provide metal wall panel assemblies capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592 or ASTM E 330 as follows:
  - 1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection no greater than 1/240 of the span.
  - 2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of the clear span.
- E. Windborne-Debris-Impact-Resistance Performance: Comply with impact resistance testing requirements for Wind Zone.
- F. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sf (0.30 L/s/sm) of wall area when tested according to ASTM E 283 at a static-air-pressure difference of 1.57 lbf/sf (75 Pa).
- G. Water Penetration under Static Pressure: No evidence of water penetration through fixed panels and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure not less than 6.24 lbf/sf (300 Pa).
- H. Thermal Movements: Engineer products and systems to accommodate thermal movements of supporting elements resulting from the following maximum change (range) in ambient and surface temperatures without buckling, damaging stresses, damaging loads on fasteners, failure of operating units to function properly, and other detrimental effects.
  - 1. Temperature Change (Range): 120 deg F (49 deg C), ambient; 180 deg F (82 deg C), material surfaces.
- I. Dimensional Tolerances: Engineer products and systems to accommodate dimensional tolerances of framing members and adjacent construction.

## **2.4 METAL WALL PANEL MATERIALS**

- A. Metallic-Coated Steel Sheet: Restricted flatness steel sheet metallic coated by the hot-dip process and pre-painted by the coil-coating process to comply with ASTM A 755 / A 755M.

1. Provide one of the following:
  - a. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653 / A 653M, G90 (Z275) coating designation; structural quality.
  - b. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792 / A 792M, Class AZ50 coating designation, Grade 40 (Class AZM150 coating designation, Grade 275); structural quality.
2. Surface: Smooth and flat.
3. Exposed Coil-Coated Finish: Fluoropolymer finish as specified elsewhere in this Section.
4. Concealed Finish: Apply pretreatment and 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 mils (0.013 mm).

## **2.5 EXPOSED-FASTENER, LAP-SEAM METAL WALL PANELS**

- A. General: Provide factory-formed metal wall panels designed to be field assembled by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps. Include accessories required for weathertight installation.
- B. Corrugated-Profile, Exposed-Fastener Metal Wall Panels: Formed with alternating curved ribs spaced at 2.67 in (68 mm) on center across width of panel.
  1. Basis of Design: CENTRIA; Econolap
  2. Material: Zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet, standard of manufacturer; 22 gage, 0.034 in (0.8 mm) nominal minimum thickness.
  3. Panel Coverage: 34-2/3 in (880 mm).
  4. Panel Height: 3/4 in (19 mm).
- C. Box-Rib-Profile, Exposed-Fastener Metal Wall Panels: Formed with raised, box-shaped ribs, evenly spaced across panel width, and with rib/recess sides angled 60 degrees or more.
  1. Basis of Design: CENTRIA; BR5-36
  2. Material: Zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet, standard of manufacturer; 22 gage, 0.034 in (0.8 mm) nominal minimum thickness.
  3. Panel Coverage: 36 in (914 mm).
  4. Rib Spacing: 7.2 in (183 mm) on center.
  5. Panel Height: 1-1/2 in (38 mm).

## **2.6 CONCEALED-FASTENER, LAP-SEAM METAL WALL PANELS**

- A. General: Provide factory-formed metal wall panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.
- B. Flush-Profile, Concealed-Fastener Metal Wall Panels: Formed with vertical panel edges and flat panel between panel edges; with flush joint between panels.
  1. Basis of Design: CENTRIA; IW 10A
  2. Material: Zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet, standard of manufacturer; 22 gage, 0.034 in (0.8 mm) nominal minimum thickness.

3. Panel Coverage: 12 in (300 mm).
  4. Panel Height: 1-1/2 in (38 mm).
- C. Flush-Profile, Concealed-Fastener Metal Wall Panels: Formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced between panel edges; with flush joint between panels.
1. Basis of Design: CENTRIA; IW 14A
  2. Material: Zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet, standard of manufacturer; 22 gage, 0.034 in (0.8 mm) nominal minimum thickness.
  3. Panel Coverage: 12 in (300 mm).
  4. Panel Height: 1-1/2 in (38 mm).
- D. Reveal-Joint, Concealed-Fastener Metal Wall Panels: Formed with vertical panel edges and flat pan between panel edges; with narrow reveal joint between panels.
1. Basis of Design: CENTRIA; IW-40A
  2. Material: Zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet, standard of manufacturer; 22 gage, 0.034 in (0.8 mm) nominal minimum thickness.
  3. Panel Coverage: 11 in (279 mm).
  4. Reveal Joint: 1 in (25 mm) wide.
  5. Panel Height: 1-1/2 in (38 mm).

## **2.7 CONCEALED-FASTENER, METAL SOFFIT PANELS**

- A. General: Provide factory-formed metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.
- B. Flush-Profile, Concealed-Fastener Metal Soffit Panels: Formed with vertical panel edges and flat panel between panel edges; with flush joint between panels.
1. Basis of Design: CENTRIA; IW 10A
  2. Material: Zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet, standard of manufacturer; 22 gage, 0.034 in (0.8 mm) nominal minimum thickness.
  3. Panel Coverage: 12 in (300 mm).
  4. Panel Height: 1-1/2 in (38 mm).

## **2.8 WALL PANEL ASSEMBLY ACCESSORIES**

- A. General: Provide components approved by metal wall panel manufacturer and as required for a complete assembly including trim, corner units, closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.
1. Closures: Provide closures fabricated of same metal as metal wall panels.
  2. Closure Strips: Closed-cell, expanded, cellular, rubber or cross-linked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1 in (25 mm) thick, flexible closure strips; cut or pre-molded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

3. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
- B. Panel Sealants: Provide the following as recommended by metal wall panel assembly manufacturer for installation indicated.
1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, non-sag, nontoxic, non-staining tape 1/2 in (12 mm) wide and 1/8 in (3 mm) thick.
  2. Elastomeric Joint Sealant: ASTM C 920; elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal exposed joints in metal wall panels and remain weathertight; and as recommended in writing by metal wall panel manufacturer.
  3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for concealed hooked-type expansion joints with limited movement.
- C. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads as appropriate for metal wall panel material. Provide exposed fasteners with heads matching color of metal wall panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.
1. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel Sheet: Hot-dip galvanized steel according to ASTM A 153 / A 153M, ASTM F 2329, or Series 300 stainless steel.
- D. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, or cold-applied asphalt emulsion complying with ASTM D 1187; compounded for 15 mils (0.4 mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- E. Self-Adhering, High-Temperature Rubberized Asphalt Flashing: Minimum 30 mils to 40 mils (0.76 mm to 1.00 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C).
  2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (-6.7 deg C).
  3. Manufacturers and Products:
    - a. Carlisle Coatings & Waterproofing; CCW WIP 300HT.
    - b. Grace Construction Products, a unit of W. R. Grace & Co.; Ultra.
    - c. Henry Company; Blueskin PE200 HT.
    - d. Metal-Fab Manufacturing, LLC; MetShield.
    - e. Owens Corning; WeatherLock Metal High Temperature Underlayment.
- F. Barrier Flashing Tape: Air-barrier manufacturer's standard adhesive and pressure-sensitive adhesive tape. Refer to Division 07 Section "Air and Water Barriers".

- G. Liquid Membrane: Air-barrier manufacturer's standard cold fluid-applied elastomeric liquid; trowel grade. Refer to Division 07 Section "Air and Water Barriers".

## **2.9 MISCELLANEOUS METAL FRAMING**

- A. Miscellaneous Metal Framing, General: ASTM C 645, cold-formed metallic-coated steel sheet, ASTM A 653 / A 653M, G90 (Z275) hot-dip galvanized or coating with equivalent corrosion resistance unless otherwise indicated.
- B. Subgirts: Manufacturer's standard C- or Z-shaped sections, 0.053 in (16 gage) (1.3 mm) minimum thickness.
- C. Zee Clips: 0.053 in (16 gage) (1.3 mm) minimum thickness.
- D. Base or Sill Angles or Channels: 0.053 in (16 gage) (1.3 mm) minimum thickness.
- E. Fasteners for Miscellaneous Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal framing members to substrates.

## **2.10 FABRICATION**

- A. General: Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Fabricate metal wall panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, and that will minimize noise from movements within panel assembly.
- E. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
  - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
  - 2. Seams: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
  - 3. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
  - 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.

5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal wall panel manufacturer.
  - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

## **2.11 FINISHES, GENERAL**

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of accepted Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of accepted Samples and are assembled or installed to minimize contrast.

## **2.12 STEEL FINISHES**

- A. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions. Provide dry film thickness, primers, color coats and clear coats required to comply with performance requirements and warranty periods indicated.
  1. PVDF Fluoropolymer Finish: Fluoropolymer finish complying with AAMA 621 and containing not less than 70 percent PVDF resin by weight in color coat.
  2. FEVE Fluoropolymer Finish: Fluoropolymer finish complying with AAMA 621 and containing 100 percent fluorinated ethylene vinyl ether (FEVE) resin in color coat.
  3. Selections: As scheduled or as indicated on drawings.

# **PART 3 - EXECUTION**

## **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements for installation tolerances, metal wall panel supports, and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.
  1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
  2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.

3. Verify that weather-resistant sheathing paper has been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and systems penetrating metal wall panels to verify actual locations of penetrations relative to seam locations of metal wall panels before metal wall panel installation.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  1. Respective manufacturer's written installation instructions.
  2. Accepted submittals.
  3. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
- B. Miscellaneous Framing: Install subgirts, base angles, sills, furring, and other miscellaneous wall panel support members and anchorages according to ASTM C 754 and metal wall panel manufacturer's written recommendations.

### **3.4 WALL PANEL ASSEMBLY INSTALLATION**

- A. General: Install metal wall panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings.
- B. Wall Panels: Install wall panels perpendicular to girts and subgirts unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
  1. Shim or otherwise plumb substrates receiving metal wall panels.
  2. Flash and seal metal wall panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until weather barrier and flashings that will be concealed by metal wall panels are installed.
  3. Install screw fasteners in predrilled holes.
    - a. Air and Water Barrier: Install a strip of barrier flashing tape behind through-wall attachments that penetrate air and water barrier.
  4. Locate and space fastenings in uniform vertical and horizontal alignment.
  5. Install flashing and trim as metal wall panel work proceeds.
  6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.

7. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete and elsewhere as indicated or, if not indicated, as necessary for waterproofing.
  8. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
  9. Provide weathertight escutcheons for pipe and conduit penetrating exterior walls.
  10. Cover fasteners with rubberized asphalt flashing strips.
- C. Fasteners: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized steel fasteners for surfaces exposed to the interior.
- D. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
- E. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weathertight performance of metal wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal wall panel manufacturer.
1. Seal metal wall panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal wall panel manufacturer.
  2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants".
- F. Lap-Seam Metal Wall Panels: Fasten metal wall panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
1. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
  2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal wall panels.
  3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
  4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
  5. Provide sealant tape at lapped joints of metal wall panels and between panels and protruding equipment, vents, and accessories.
  6. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on end laps; on side laps of nesting-type panels; on side laps of corrugated nesting-type, ribbed, or fluted panels; and elsewhere as needed to make panels weathertight.
  7. At panel splices, nest panels with minimum 6 in (150 mm) end lap, sealed with butyl-rubber sealant and fastened together by interlocking clamping plates.

### **3.5 METAL SOFFIT PANEL INSTALLATION**

- A. In addition to complying with requirements in "Wall Panel Assembly Installation" Article, install metal soffit panels to comply with requirements in this article.
- B. Metal Soffit Panels: Provide metal soffit panels full width of soffits. Install panels perpendicular to support framing.

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

### **3.6 ACCESSORY INSTALLATION**

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

### **3.7 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.
1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.
- B. Testing Agency Field Service: Engage a qualified independent testing agency to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense.

- C. Owner's Testing Agency Field Service: The Owner may employ and pay a qualified independent testing agency to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense.
  - 1. Before installation of interior finishes, wall panel system shall be tested in accordance with Division 01 Section "Field Test for Water Leakage".
- D. Prepare test and inspection reports.

### **3.8 CLEANING**

- A. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal wall panel installation, clean finished surfaces as recommended by metal wall panel manufacturer. Maintain in a clean condition during construction.
- B. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

### **3.9 ARCHITECTURAL METAL FINISH SCHEDULE:** Refer to Exterior Elevation drawings.

**END OF SECTION**

**17-13 OSU, College of Osteopathic Medicine at  
Cherokee Nation  
Childers Architect  
2019-07-26**

**FORMED METAL  
WALL PANELS**

## **SECTION 07 4243**

### **COMPOSITE METAL WALL PANELS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Factory-formed composite metal wall panels and supplementary items necessary for installation.

##### **1.2 DEFINITIONS**

- A. Metal Wall Panel Assembly: Metal wall panels, attachment system components, miscellaneous metal framing, and accessories necessary for a complete wall panel system.

##### **1.3 DELEGATED ENGINEERING REQUIREMENTS**

- A. Contract Documents Design Intent: Drawings and Specifications indicate design intent for products and systems and do not necessarily indicate or specify total Work required. Contract Documents shall not be construed as an engineered design; furnish and install all Work required for a complete installation.
- B. Delegated Engineering Responsibility: Contractor shall employ a qualified professional engineer to provide engineering for products and systems including attachment to building structure required to meet design intent of Contract Documents.
  - 1. Preparation of structural analysis data including engineering calculations, shop drawings and other submittals signed and sealed by the qualified professional engineer.
- C. Delegated Engineering Professional Qualifications: Professional engineer legally authorized to practice in jurisdiction where Project is located and experienced in providing engineering services of kind indicated for products and systems similar to this Project and has a record of successful in-service performance.
- D. Coordination of Contract Documents and Work:
  - 1. Product Variations: In the event of minor differences between products and systems of acceptable or available manufacturers, Contractor shall notify Architect of such differences and resolve conflicts in a timely manner. Failure of Contractor to provide notification shall be construed as acceptance of conditions indicated, and changes caused by minor differences between products and Contract Documents shall be included in the Work at no additional cost to Owner.

2. Allowable Adjustments: Minor dimension and profile adjustments may be made in interest of fabrication or erection methods or techniques or ability to satisfy design intent, provided design intent is maintained as determined by Architect. Proposed deviations shall include a detailed analysis of impact to adjacent substrates or other building systems, including related design or construction cost impacts. If accepted by Architect, deviations causing changes in materials, constructability, substrates, or conditions shall be included in the Work at no additional cost to Owner

#### **1.4 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work. Include the following:
  1. Show fabrication and installation layouts of metal wall panels.
  2. Show details of edge conditions, side-seam and end-lap joints, panel profiles, corners, anchorages, trim, flashings, closures, and terminations.
  3. Show details for securing metal wall panel assembly, including layout of fasteners and other attachments.
  4. Show details of wall panel penetrations.
  5. Show details of connections to adjoining work.
  6. Indicate where and how the system deviates from Contract Documents.
  7. Shop drawings shall contain seal of a professional engineer currently registered in licensing jurisdiction of the project and a written statement that the framing system conforms to project requirements, applicable codes, and specified conditions.
  8. Provide for information only, material properties and other information needed for structural analysis including computations, prepared, signed, or, and sealed by a professional engineer licensed to practice in the jurisdiction where the project is located.
  9. Submittal shall contain statement explaining how proposed system design will accommodate infiltrated and condensate water.
  10. Design Modifications: If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and Shop Drawings. Do not adversely affect the appearance, durability, or strength of units when modifying details or materials and maintain the general design concept.
  11. Include laboratory mock-up Shop Drawings, prepared by a qualified preconstruction testing agency, showing details of laboratory mock-up.
    - a. Resubmit Shop Drawings with changes made to details of glazed aluminum framing systems, to successfully complete preconstruction testing.
- C. Coordination Drawings: Exterior elevations drawn to scale and coordinating penetrations and wall-mounted items. Show the following:
  1. Wall panel assembly and attachments.
  2. Girts and framing.
  3. Wall-mounted items including doors, windows, louvers, and lighting fixtures.

4. Penetrations of wall panels by pipes and utilities.
- D. Samples for Initial Selection: For each type of metal wall panel indicated with factory-applied color finishes.
1. Include similar samples of trim and accessories involving color selection.
  2. Include manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each sealant exposed to view.
- E. Samples for Verification Purposes: For each type of exposed finish required, prepared on samples of size indicated below.
1. Metal Wall Panels: 12 in (300 mm) long by actual panel width. Include fasteners, closures, and other metal wall panel accessories.
  2. Trim and Closures: 12 in (300 mm) long. Include fasteners and other exposed accessories.
  3. Accessories: 12 in (300 mm) long samples for each type of accessory.
  4. Exposed Gaskets: 12 in (300 mm) long.
  5. Exposed Sealants: For each type and color of joint sealant required. Install joint sealants in 1/2 in (12 mm) wide joints formed between two 6 in (150 mm) long strips of material matching the appearance of metal-faced composite wall panels adjacent to joint sealants.

## **1.5 INFORMATIONAL SUBMITTALS**

- A. Delegated Engineering Calculations: Informational submittal for products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation; test reports are not acceptable substitute for calculations.
- B. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.
- C. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
1. Product Approvals: Submit Florida Product Approval or Product Control Notice of Acceptance (NOA) issued by Miami-Dade County Building Code Compliance Office (BCCO) or other product approval acceptable to authorities having jurisdiction for systems used at exterior of building.
- D. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".
- E. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.

2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- F. Qualification Data:
1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
- G. Warranty: Sample of warranty.
1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

## **1.6 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: To include in maintenance manuals.

## **1.7 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 10 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Installer/fabricator Qualifications:
1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project
  3. Manufacturer Acceptance: Installer/fabricator shall be certified, approved, licensed, or acceptable to manufacturer to install products.
- C. Preconstruction Testing Service: Provide composite metal wall panels that comply with test-performance requirements indicated, as evidenced by reports based on Project-specific preconstruction testing by a qualified testing agency.
1. Refer to Division 01 Section "Testing Mock-up For Building Enclosure Systems".
- D. Preconstruction Compatibility and Adhesion Testing: Submit samples of materials that will contact joint sealants to joint-sealant manufacturers for testing indicated in subparagraphs below:
1. Use manufacturer's standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
    - a. Perform tests under environmental conditions replicating those that will exist during installation.

2. Submit no fewer than nine pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
  3. Schedule enough time for testing and analyzing results to prevent delaying the Work.
  4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures, including use of specially formulated primers.
- E. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.
1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.
    - a. Show typical components, attachments to building structure, and requirements of installation.
  2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
  3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
  4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
  5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work

## **1.8 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.
1. Participants:
    - a. Architect.
    - b. Contractor, including superintendent.
    - c. Installer/fabricator, including project manager and supervisor.
    - d. If requested, Manufacturer's qualified technical representative.
    - e. Installers of other construction interfaced with Work.
    - f. Testing agency.
  2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
    - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
    - b. Review Contract Document requirements.
    - c. Review approved submittals.
    - d. Review inspection and testing requirements.
    - e. Review environmental conditions and procedures for coping with unfavorable conditions.

- f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.

3. Record discussions, including decisions and agreements, and prepare report.

## **1.9 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver components, sheets, metal wall panels, and other manufactured items so as not to be damaged or deformed. Package metal wall panels for protection during transportation and handling.
- B. Unload, store, and erect metal wall panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal wall panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal wall panels to ensure dryness, with positive slope for drainage of water. Do not store metal wall panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal wall panel for period of metal wall panel installation.

## **1.10 PROJECT CONDITIONS**

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal wall panels to be performed according to manufacturer's written instructions and warranty requirements.
- B. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

## **1.11 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **1.12 WARRANTY**

- A. Manufacturer's Warranty: Furnish manufacturer's written material and labor warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design of product. "Defects" are defined to include but not limited to deterioration or failure to perform as required.

1. Coverage of warranty includes but is not limited to the following:

- a. Structural failures including, but not limited to, excessive deflection.
- b. Noise or vibration created by wind and thermal and structural movements.
- c. Deterioration of metals and other materials beyond normal weathering.
- d. Water penetration through fixed panels.

2. Warranty Period: Manufacturer shall warrant the products to be free from material and labor Defects for a period of 5 years from date of Substantial Completion
- B. Installer/Fabricator's Warranty: Furnish installer/fabricator's written workmanship warranty signed by an authorized representative using installer/fabricator's standard form agreeing to provide labor required to repair or replace work which exhibits workmanship defects. "Defects" is defined to include but not limited to deterioration or failure to perform as required.
1. Warranty Period: Installer/fabricator shall warrant the installation to be free from workmanship Defects for a period of 2 years from date of Substantial Completion.
- C. Factory Applied Finish Warranty for High-Performance Fluoropolymer Finishes: Furnish manufacturer's written warranty signed by an authorized representative using manufacturer's standard form agreeing to repair finish or replace work which exhibits finish defects. "Defects" is defined to include but not limited to deterioration or failure of finish to perform as required.
1. Coverage includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  2. Warranty Period: Manufacturer shall warrant the installation to be free from finish defects for a period of 20 years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
1. Alcoa Inc.
  2. Citadel
  3. Alucobond, division of 3A Composites USA, Inc.
  4. ALPOLIC, division of Mitsubishi Plastic Composites America, Inc.
  5. Larson, by Alucoil North America.
- B. System Type:
1. Rear Ventilated Rain Screen: System with open reveal joints; no field sealant required in joints unless otherwise indicated.
  2. Rout and Return Dry Seal: System with perimeter aluminum extrusion with integral weather-stripping; no field sealant required in joints unless otherwise indicated.
  3. Rout and Return Wet Seal: System with wet sealed (caulked) reveal joints.

## **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

## **2.3 PERFORMANCE REQUIREMENTS; EXTERIOR PANELS**

- A. General Performance: Engineer products and systems to withstand loads within limits of allowable working stresses of the materials involved under conditions indicated and without permanent deformation or failure of materials.
- B. Delegated Design: Design metal wall panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- C. Design Loads: Engineer to withstand design loads including, but not limited to, gravity, wind, seismic, and erection design loads and thermal movements established by authorities having jurisdiction, applicable local building codes, and as indicated.
  - 1. Structural Movement: Engineer to withstand movements of structure including, but not limited to, drift, twist, column shortening, long-term creep and deflection from uniformly distributed and concentrated live loads. Contractor shall obtain required design data and identify movements accommodated on submittal drawings.
- D. Structural-Test Performance: Provide metal wall panel assemblies capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592 or ASTM E 330 as follows:
  - 1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection no greater than 1/240 of the span.
  - 2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
- E. Windborne-Debris-Impact-Resistance Performance: Comply with impact resistance testing requirements for Wind Zone.
- F. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sf (0.30 L/s/sm) of wall area when tested according to ASTM E 283 at a static-air-pressure difference of 6.24 lbf/sf (300 Pa).
- G. Water Penetration under Static Pressure: No evidence of water penetration through fixed panels and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure not less than 6.24 lbf/sf (300 Pa).
- H. Thermal Movements: Engineer products and systems to accommodate thermal movements of supporting elements resulting from the following maximum change (range) in ambient and surface temperatures without buckling, damaging stresses, damaging loads on fasteners, failure of operating units to function properly, and other detrimental effects.

1. Temperature Change (Range): 120 deg F (49 deg C), ambient; 180 deg F (82 deg C), material surfaces.
- I. Dimensional Tolerances: Engineer products and systems to accommodate dimensional tolerances of framing members and adjacent construction.

## **2.4 COMPOSITE METAL WALL PANELS**

- A. General: Provide factory-formed and -assembled, metal-faced composite wall panels fabricated from two metal facings bonded, using no glues or adhesives, to manufacturer's solid, extruded thermoplastic core; formed into profile for installation method indicated. Include attachment system components and accessories required for weathertight system.
- B. Exterior Panels:
  1. Fire-Retardant Core: Noncombustible, with the following Class A surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
    - a. Flame-Spread Index: 25 or less.
    - b. Smoke-Developed Index: 450 or less.
  2. NFPA 285 Compliance: Provide panels and assembly that comply with and pass NFPA 285 "Standard Method of Test for the Evaluation of Fire Propagation Characteristics of Exterior Non-Load Bearing Wall Assemblies Containing Combustible Components."
- C. Aluminum Facing Sheets: Coil-coated sheets, ASTM B 209 / B 209M, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
  1. Surface: Smooth and flat.
  2. Thickness: 0.020 in (0.50 mm).
  3. Core: Fire retardant.
  4. Exposed Coil-Coated Finish: Fluoropolymer finish as specified elsewhere in this Section.
  5. Concealed Finish: Apply pretreatment and 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 mils (0.013 mm).
- D. Overall Panel Thickness: 0.157 in (4 mm) minimum.

## **2.5 METAL SOFFIT PANELS**

- A. Composite Metal Soffit Panels: Composite metal wall panel manufacturer's standard panel for horizontal conditions; meeting same requirements as that for specified vertical panels.

## **2.6 WALL PANEL ASSEMBLY ACCESSORIES**

- A. General: Provide components approved by metal wall panel manufacturer and as required for a complete assembly including trim, corner units, closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.

- B. Panel Sealants: As specified in Division 07 Section "Joint Sealants" and as recommended in writing by panel manufacturer.
- C. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads as appropriate for metal wall panel material.
  - 1. Concealed Fasteners: Provide concealed fasteners with EPDM, PVC, or neoprene sealing washers.
- D. Aluminum Extrusions: ASTM B 221 / B 221M, alloy and temper recommended by manufacturer for type of use and finish indicated.
- E. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, or cold-applied asphalt emulsion complying with ASTM D 1187; compounded for 15 mils (0.4 mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- F. Barrier Flashing Tape: Air-barrier manufacturer's standard adhesive and pressure-sensitive adhesive tape. Refer to Division 07 Section Air and Water Barriers.

## **2.7 MISCELLANEOUS METAL FRAMING**

- A. Miscellaneous Metal Framing, General: ASTM C 645, cold-formed metallic-coated steel sheet, ASTM A 653 / A 653M, G90 (Z275) hot-dip galvanized or coating with equivalent corrosion resistance unless otherwise indicated.
- B. Subgirts: Manufacturer's standard C- or Z-shaped sections, 0.053 in (16 gage) (1.3 mm) nominal thickness.
- C. Zee Clips: 0.053 in (16 gage) (1.3 mm) nominal thickness.
- D. Base or Sill Angles or Channels: 0.053 in (16 gage) (1.3 mm) nominal thickness.
- E. Fasteners for Miscellaneous Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal framing members to substrates.

## **2.8 FABRICATION**

- A. General: Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.
- C. Metal-Faced Composite Wall Panels: Factory form panels in a continuous process with no glues or adhesives between dissimilar materials. Trim and square edges of sheets with no displacement of face sheets or protrusion of core material.

1. Form panel lines, breaks, and angles to be sharp and true, with surfaces free from warp and buckle.
  2. Fabricate panels with sharply cut edges, with no displacement of face sheets or protrusion of core material.
  3. Fabricate panels with panel stiffeners, as required to comply with deflection limits, attached to back of panels with structural silicone sealant or bond tape.
  4. Dimensional Tolerances:
    - a. Panel Bow: 0.8 percent maximum of panel length or width.
    - b. Squareness: 0.25 in (5 mm) maximum.
- D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
  2. Seams: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
  3. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
  4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
  5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal wall panel manufacturer.
    - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

## 2.9 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of accepted Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of accepted Samples and are assembled or installed to minimize contrast.

## **2.10 ALUMINUM FINISHES**

- A. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions. Provide dry film thickness, primers, color coats and clear coats required to comply with performance requirements and warranty periods indicated.
  - 1. PVDF Fluoropolymer Finish: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat.
  - 2. FEVE Fluoropolymer Finish: Fluoropolymer finish complying with AAMA 2605 and containing 100 percent fluorinated ethylene vinyl ether (FEVE) resin in color coat.
  - 3. Selections: As scheduled or as indicated in Design Selections.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements for installation tolerances, metal wall panel supports, and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.
  - 1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
  - 2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
  - 3. Verify that weather-resistant sheathing paper has been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and systems penetrating metal wall panels to verify actual locations of penetrations relative to seam locations of metal wall panels before metal wall panel installation.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer's written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
- B. Miscellaneous Framing: Install subgirts, base angles, sills, furring, and other miscellaneous wall panel support members and anchorages according to ASTM C 754 and metal wall panel manufacturer's written recommendations.

### **3.4 WALL PANEL ASSEMBLY INSTALLATION**

- A. General: Install metal wall panels and accessories according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings.
- B. Wall Panels: Install wall panels perpendicular to girts and subgirts unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
  - 1. Shim or otherwise plumb substrates receiving metal wall panels.
  - 2. Flash and seal metal wall panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until weather barrier and flashings that will be concealed by metal wall panels are installed.
  - 3. Install screw fasteners in predrilled holes.
    - a. Air and Water Barrier Sheet Good Substrate: Install a strip of barrier flashing tape behind through-wall attachments that penetrate air and water barrier.
  - 4. Locate and space fastenings in uniform vertical and horizontal alignment.
  - 5. Install flashing and trim as metal wall panel work proceeds.
  - 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
  - 7. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete and elsewhere as indicated or, if not indicated, as necessary for waterproofing.
  - 8. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
  - 9. Provide weathertight escutcheons for pipe and conduit penetrating exterior walls.
- C. Fasteners: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized steel fasteners for surfaces exposed to the interior.
- D. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
- E. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weathertight performance of metal wall panel assemblies as specified in Division 07 Section "Joint Sealants" and as recommended by metal wall panel manufacturer.

1. Seal metal wall panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal wall panel manufacturer.
  2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants".
- F. Attachment System Installation, General: Install attachment system required to support metal-faced composite wall panels and to provide a complete weathertight wall system, including subgirts, perimeter extrusions, tracks, drainage channels, panel clips, and anchor channels.
1. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.
  2. Do not begin installation until weather barrier and flashings that will be concealed by composite panels are installed.
- G. Rout and Return Wet Seal Clip Installation: Attach panel clips to supports at each metal-faced composite wall panel joint at locations, spacings, and with fasteners recommended by manufacturer. Attach routed-and-returned flanges of wall panels to panel clips with manufacturer's standard fasteners.
1. Seal horizontal and vertical joints between adjacent panels with sealant backing and sealant. Install sealant backing and sealant according to requirements specified in Division 07 Section "Joint Sealants".

### **3.5 METAL SOFFIT PANEL INSTALLATION**

- A. In addition to complying with requirements in "Wall Panel Assembly Installation" Article, install metal soffit panels to comply with requirements in this article.
- B. Metal Soffit Panels: Provide metal soffit panels full width of soffits. Install panels perpendicular to support framing.
1. Flash and seal panels with weather closures where metal soffit panels meet walls and at perimeter of all openings.
- C. Metal Fascia Panels: Align bottom of panels and fasten with blind rivets, bolts, or self-tapping screws. Flash and seal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

### **3.6 ACCESSORY INSTALLATION**

- A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in weathertight and weather-resistant performance.
  2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 ft (3 m) with no joints allowed within 24 in (600 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and weathertight, form expansion joints of intermeshing hooked flanges, not less than 1 in (25 mm) deep, filled with mastic sealant (concealed within joints).

### **3.7 ERECTION TOLERANCES**

- A. Installation Tolerances: Shim and align metal-faced composite wall panel units within installed tolerance of 1/4 in per 20 ft (6 mm in 6 m), non-accumulative, on level, plumb, and location lines as indicated and within 1/8 in (3 mm) offset of adjoining faces and of alignment of matching profiles.

### **3.8 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.
1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics
- B. Testing Agency: Employ and pay a qualified independent testing agency to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense.
- C. Testing Agency: The Owner may employ and pay a qualified independent testing agency to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense.
- D. Rout and Return Wet Seal Installation:
1. Before installation of interior finishes, wall panel system shall be tested in accordance with Division 01 Section "Field Test for Water Leakage".
- E. Prepare test and inspection reports.

### **3.9 CLEANING**

- A. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal wall panel installation, clean finished surfaces as recommended by metal wall panel manufacturer. Maintain in a clean condition during construction.
- B. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

### **3.10 ARCHITECTURAL METAL FINISH SCHEDULE: Refer to Exterior Elevations drawings.**

**END OF SECTION**

## **COMPOSITE WOOD WALL PANELS**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Wood veneer laminate panels.
- B. Accessories

#### **1.02 RELATED REQUIREMENTS**

- A. Section 05 40 00 – Cold-Formed Metal Framing
- B. Section 06 10 00 – Rough Carpentry: Wall sheathing [and furring]
- C. Section 07 25 00 – Air and Vapor Retarders
- D. Section 07 62 00 – Sheet Metal Flashing and Trim.
- E. Section 07 92 00 – Joint Sealants.

#### **1.03 REFERENCE STANDARDS**

- A. ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a
- B. AWP A U1 – Use Category System: User specification for Treated Wood; 2012
- C. EN 438-7 – High-Pressure Decorative Laminates (HPL); 2005
- D. ICC-ES – ESR-3462, Parklex Façade F Wall Panel Cladding System; 2017

#### **1.04 ADMINISTRATIVE REQUIREMENTS**

- A. See Section 01 30 00 – Administrative Requirements for pre-installation meeting requirements.
- B. Pre-Installation Conference: Convene conference 1 week before starting work to establish procedures to maintain optimum working conditions and to coordinate work with related and adjacent work.

#### **1.05 SUBMITTALS**

- A. See Section 01 30 00 – Administrative Requirements for submittal procedures.
- OR -
- A. See Section 01 33 00 – Submittal Procedures for additional requirements.

- B. Product Data: Submit manufacturer's product data, including sub-framing system and accessories.
- C. Shop Drawings: Show sub-framing spacing and member type, panel layout, fastener spacing, flashing locations, corner and transition details[, \_\_\_\_\_].
- D. Samples: Submit three 8.5 by 11 samples of each finish/color of wall panels.
- E. Manufacturer's Certification: Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application.
- F. Installation Instructions: Manufacturer's written instructions including surface preparation and installation procedures.

#### **1.06 QUALITY ASSURANCE**

- A. Fire resistant panel or slat products, Façade F, shall be stamped with manufacturer's name, address, product name, thickness, color, batch number and evaluation report number (ESR-3462).

#### **1.07 MOCK-UP**

- A. See Section 01 40 00 – Quality Requirements for additional requirements.
- B. Construct system mock-up panel size as directed; include: sub-framing, water-resistant membrane, air barrier, insulation, vapor barrier, back-up wall assembly; include: outside corner, inside corner, door/window opening, transition to adjacent materials.
- C. Locate where directed by Architect.
- D. Mock-up may remain as part of the Work.

#### **1.08 DELIVERY, STORAGE, AND HANDLING**

- A. Transportation:
  - 1. Transport panels horizontally and strapped down to avoid sliding across one another.
  - 2. Protect edges and corners.
  - 3. Maintain in original protective packaging until use.
- B. Storage:
  - 1. Store panels horizontally with supports no more than 31-1/2 (80 mm) inches apart.
  - 2. Store panels in clean dry location protected from rain and sun within manufacturer's recommended temperature and humidity range.
- C. Handling:
  - 1. Wear protective gloves when handling.
  - 2. Follow manufacturer's recommendation for dust collection and removal.

## **1.09 WARRANTY**

- A. See Section 01 78 00 – Closeout Submittals for additional warranty requirements.
- B. Provide manufacturer's standard 10-year warranty covering structural stability, color and finish retention.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Parklex USA, Inc.; 212 River Park North Drive, Woodstock, GA 30188; telephone: 678-401-7403; website: <http://www.parklex.com>
- B. Substitutions: Not allowed [See Section 01 60 00 – Product Requirements].

### **2.02 APPLICATIONS**

- A. System
  - 1. Description: Exposed fastened system
  - 2. Panel Type: Parklex Façade F (fireproof)
  - 3. Fastening System: Screws

### **2.03 MATERIALS**

- A. Panels: High Pressure Compact Laminate, composing of wood veneer and paper fibers treated with thermosetting resins, designed for flush assembly.
  - 1. Size: 48 by 96 inches (1220 by 2440 mm)
  - 2. Thickness: 10 mm
  - 3. Edge: Square
- B. Soffit Panels: High Pressure Compact Laminate, composing of wood veneer and paper fibers treated with thermosetting resins, designed for flush assembly.
  - 1. Slat Type: Parklex Façade F (fireproof)
  - 2. Size: 48 by 96 inches (1220 by 2440 mm)
  - 3. Thickness: 10 mm
  - 4. Edge: Square
  - 5. Mounting Method: Exposed
- C. Properties; EN438-7, and ICC ESR-3462:
  - 1. Dimensional Stability: 0.3 percent cumulative dimensional change
  - 2. Maximum Height of Impact with No Visible Signs of Cracking:  $\geq 1,800$  mm
  - 3. Tensile Strength (Long Grain):  $\geq 60$  MPa
  - 4. Flexural Strength:
    - a. Long Grain:  $\geq 80$  MPa
    - b. Cross Grain:  $\geq 80$  MPa

5. Thermal Resistance:
  - b. Façade F: 0.220 k
6. UV Resistance:
  - a. Contrast, Gray Scale Rating:  $\geq 3$
  - b. Aspect Rating:  $\geq 4$
7. Artificial Weathering Resistance:
  - a. Contrast, Gray Scale Rating:  $\geq 3$
  - b. Appearance Rating:  $\geq 4$
8. Water Vapor Permeability:
  - a. Wet Cup Method: 100 $\mu$
  - b. Dry Cup Method: 250 $\mu$
9. Density:  $\geq 1.35 \text{ g/cm}^3$
10. Water Absorption:
  - b. Façade F:  $\leq 8$  percent
11. Fire Resistance  $\geq 6$  mm thickness:
  - b. Façade F: B-s2, d0; ICC-ESR, ASTM E84: Class A, NFPA 285 (Exposed fastener system)

## **2.04 ACCESSORIES**

- A. Exposed Fasteners:
  1. Based on Parklex's recommendation.
- B. Plugs: Matching veneer lumber unless otherwise indicated, 3/16 inch (14.3 mm) diameter.
  1. Use Parklex supplied drill bits for pre-drilling.
- C. Sealant: Silicone type as specified under Section 07 92 00 – Joint Sealants.
- D. Ventilation: Molded plastic or woven polyethylene designed for provide air flow behind panels but restrict insect entering air space.
  1. Product: Cor-A-Vent SV-5 by Cor-A-Vent or equal.

## **2.05 FINISHES**

- A. Exterior Panel Finishes: Onix, Copper & Antra.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Examine substrate and framing members for alignment
- B. Notify Architect of conditions that would adversely affect installation.

- C. Do not begin surface preparation or installation until unacceptable conditions are corrected.
- D. Ensure that weather barrier is properly installed and undamaged.

### **3.02 PREPARATION**

- A. Securely install wall furring system plumb and square, and correctly spaced to accommodate panel or slat system.

### **3.03 INSTALLATION**

- A. Install panels in strict compliance with manufacturer's written instructions.
  - 1. Comply with ICC-ESR-3462 where Class A fire resistance is required.
- B. Use recommended cutting tools, equipment, and procedures.
- C. Provide a minimum of 1/4 inch (6 mm) expansion at panel edges.
  - 1. Do not seal joints.
- D. Follow shop drawings for sub-framing support, and fastener location and spacing.
- E. Provide 3/4 inch (19 mm) clear air gap behind panels[ and install vent strips at top and bottom of wall as detailed].

### **3.04 EXPOSED FASTENER SYSTEMS**

- A. Ensure that mounting points are larger than fastener shank diameter as noted below, except for fixed, center-most fastener from which expansion and contraction occurs.
  - 1. Screws: 1/8 inch (3.2 mm)
- B. Center fasteners within floating mounting points.
- C. Fastener heads to be parallel with panel surface.

### **3.07 SOFFIT AND DROPPED CEILINGS**

- A. Install ceiling of soffit panels using exposed fastener system described above.
- B. Maximum Furring Spacing:

1. <u>Panel Thickness:</u>	<u>Max. Horizontal Spacing:</u>
10 mm	23-5/8 inches (600 mm)

### **3.09 CLEANING**

- A. Clean stains and excess adhesive from panels following manufacturer's instructions.
  - 1. Do NOT use abrasive cleaning cloths or sponges, or harsh solvents such as acetone, ethyl acetate or MEK (Methyl Ethyl Keytone) on any surface to clean panels.

- B. Completely remove protective film from panels immediately after installation

### **3.10 PROTECTION**

- A. Protect panels from damage by placing thick cardboard corners at building corners, and lining passageways and walls adjacent to material handling routes with protective pads or sheet goods.
- B. If a panels or slats are damaged during construction or correction period, contact Parklex for instructions to send portion of damaged material to Parklex for replacement closely matching existing.

- 3.11 **WOOD PANELFINISH SCHEDULE:** Refer to Exterior Elevation drawings.

**END OF SECTION**

**SECTION 07 4623**  
**CEDAR SOFFIT SIDING**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Tongue & Groove soffit siding.

**1.2 RELATED SECTIONS**

- A. Division 06 - Rough Carpentry.

**1.3 REFERENCES**

- A. Western Red Cedar Lumber Association "Designer's Handbook".
- B. Western Red Cedar Lumber Association "Specifying Western Red Cedar Siding".
- C. Western Red Cedar Lumber Association "Installing Cedar Siding".
- D. Western Red Cedar Lumber Association "Guide to Finishing Western Red Cedar".
- E. NLGA - National Lumber Grades Authority "Grading Standards".
- F. WCLIB - West Coast Lumber Inspection Bureau "Grading Standards".
- G. WWPA - Western Wood Products Association "Grading Rules".

**1.4 SUBMITTALS**

- A. Submit under provisions of Section 01 30 00.
- B. Western Red Cedar Lumber Association's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
- C. Selection Samples: For each finished product specified, two complete sets of color chips representing manufacturer's full range of available materials and finished appearance.
- D. Verification Samples: For each finish product specified, three samples, nominal size 5 1/2 inches (140 mm) square representing actual product with finished color and texture.

**1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer shall be a member of the Western Red Cedar Lumber Association capable of providing all Western Red Cedar siding materials specified in this section.

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**CEDAR SOFFIT SIDING**

- B. Installer Qualifications:
1. Installer shall have five (5) years experience installing cedar trim on the type and size of project specified by this section.
  2. Installer shall be licensed, registered or otherwise approved by the local jurisdiction to install Cedar Siding.
- C. Installation: Products shall be installed according to Western Red Cedar Lumber Association installation guidelines and adhere to local building codes.

## **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Inspect the materials upon delivery to assure that specified products have been received.
- B. Store materials in safe area, away from construction traffic; store under cover and off ground, protected from moisture.
- C. Keep materials clearly separated and identified with grade marks legible. Keep damaged material identified as damaged and stored separately.

## **1.7 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.

## **1.8 SUPPLEMENTAL MATERIALS**

- A. Fasteners, supports, and hangers shall be provided by manufacturers other than member organizations of the WRCLA, and conform to the requirements set forth by this section.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturer: Western Red Cedar Lumber Association, which is located at: 1501 - 700 W. Pender St. Pender Place 1, Business Bldg. ; Vancouver, BC, Canada V6C 1G8; Toll Free Tel: 866-778-9096; Tel: 604-684-0266; Fax: 604-687-4930; Email: [request info](#); Web: [www.wrcla.org](http://www.wrcla.org)
- B. Requests for substitutions will be considered in accordance with provisions of Section 01600.
- C. Clear Cedar Tongue-and-Groove Siding: Western Red Cedar graded to meet NLGA "Grading Standards," paragraph 200. All exterior wood soffits to meet NFPA 703 & IBC 2006 requirements for "fire retardant treated wood". All exterior wood to be labeled exterior and that it's been fire treated.
1. Grade: Clear Heart.
  2. Grade: A Clear and Better.
  3. Grade: A Clear and Better with a percentage of B Clear allowed.
    - a. B Clear allowed: 15% percent.
  4. Pattern: V-grooved two sides (EV2S)WRCLA2.
  5. Pattern: Center matched tongue-and-groove.
  6. Texture: Smooth faced.

7. Moisture Content: Kiln-dried.
8. Finish: Factory primed.
9. Finish: Factory finished.

## **2.2 FASTENERS**

- A. Nails:
  1. Material: No. 304 stainless steel.
  2. Length: Must be sufficient to penetrate solid wood a minimum of 1 1/4"

## **2.3 PROTECTING FINISH**

- A. Water repellant, fungus and mildew resistant penetrating stain that is resistant to Ultra Violet (UV) light.
  1. Color: Translucent.
- B. Follow guidelines of the Western Red Cedar Lumber Association.
- C. Adhere to coating manufacturer's instructions.

## **PART 3 EXECUTION**

### **3.1 PREPARATION**

- A. Coordinate work with related trades; scribe and cope siding boards for accurate fit. Allow installation of related work to avoid cutting and patching.
- B. Select siding boards of longest possible lengths. Discard boards that are warped, twisted, bowed, crooked or otherwise defective.

### **3.2 INSTALLATION**

- A. Follow installation instructions specified in the Western Red Cedar Lumber Association's Installing Cedar Siding publication and DVD.
- B. Installation must comply with local building codes and regulations.
- C. Finish materials on all sides and ends. Apply touch up coating on new cuts. Factory primed or finishing is preferred.

### **3.3 ADJUSTING AND CLEANING**

- A. As work proceeds, maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris related to this work.

### **3.4 MAINTENANCE**

- A. Explain proper maintenance procedures to owner or owner's representative at project closeout.
- B. Visually inspect siding, caulking, flashing annually for overall condition. Re-apply caulking and coating as necessary. Adjust flashing as required.
- C. The use of pressure washers is not recommended.

## **END OF SECTION**

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**CEDAR SOFFIT SIDING**

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**CEDAR SOFFIT SIDING**

**SECTION 07 4800**  
**RAINSREEN ATTACHMENT SYSTEM (MFI)**

**PART-1 GENERAL**

**1.1 SUMMARY**

- A. Provide a thermally broken, rainscreen attachment system for attachment of exterior cladding installed over exterior mineral fiber insulation.
- B. Related Sections:
  - 1. Refer to Division 05 Section "Steel Stud Framing".
  - 2. [Refer to Division 06 Section "Rough Carpentry" for wood framing.]
  - 3. Refer to Division 06 Section "Sheathing".
  - 4. Refer to Division 07 Section "Air Barrier"
  - 5. Refer to Division 07 Section "Composite Wood wall Panels" for wood wall panels.
  - 6. Refer to Division 07 Section "Thermal Insulation" for exterior mineral fiber insulation.

**1.2 SYSTEM DESCRIPTION**

- A. System assembly shall include the following components from the substrate out:
  - 1. Substrate: Wall framing assembly and sheathing [Concrete masonry unit wall] [Concrete wall]
  - 2. Weather Resistant/Air Barrier over substrate.
  - 3. Mineral fiber insulation.
  - 4. Thermally broken rainscreen attachment system.
  - 5. Exterior cladding.
- B. Design Requirements:
  - 1. Manufacturer is responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
  - 2. Employ registered professional engineer, licensed to practice engineering in jurisdiction where Project is located, to engineer each component of rainscreen attachment system.
  - 3. Structural Design: Exterior-insulated rainscreen wall assembly capable of withstanding effects of load and stresses from dead loads, wind loads, ice loads (if applicable) as indicated on Structural General Notes on Structural Drawings, and normal thermal movement without evidence of permanent defects of assemblies or components.
    - a. Thermal Movements: Provide assemblies that allow for thermal movements resulting from the following maximum ambient temperatures by preventing overstressing of components and other detrimental effects:

- 1) Temperature Change (range): 120 degrees Fahrenheit (67 degrees C), ambient:
4. Support Framing/Attachment System:
  - a. Frequency and spacing of brackets as indicated by manufacture in project specific engineering package.
- C. Performance Requirements:
  1. Rainscreen Attachment System Performance: Comply with ANSI/ASHRAE 90.1-2010 maximum U-Value for walls.
  2. Thermal Performance:
    - a. Wall Assembly effective R-Value (U-Factor): R-VALUE 13
    - b. Full constructed exterior assembly must have a minimum 90% EFFECTIVE R-value when compared to the exterior insulation's rated R-Value.
    - c. Continuous framing profiles (including C- or Z-shaped sections or furring) penetrating insulation not allowed.
    - d. Perform effective R-Value calculation or modeling in accordance with ASHRAE guidelines.
  3. Structural Performance:
    - a. Framing Members:
      - 1) Test framing components to AAMA TIR- A8-[04] – Section 7.2 to determine structural performance and effective moment of inertia for each perforated component. Minimum Effective Moment of Inertia for Primary Rail: 0.0134 in<sup>4</sup>.
      - 2) Localized bending stress for eccentrically loaded framing members must be evaluated with the maximum effective length of resisting element not more than 12 inches.
    - b. Fasteners:
      - 1) Tension shall be taken as sum of direct tension plus tension due to prying for eccentrically loaded connections. Prying may be reduced or eliminated if proven via engineering analysis or testing.
      - 2) Minimum Safety Factor of 3 for both tension and shear values.
      - 3) Combined tension and shear shall be evaluated according to an interaction formula. Sum of terms shall not exceed 1.0.

### 1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's product literature and descriptions of testing performed on system components to indicate meeting or exceeding specified performance.
- B. Shop Drawings:
  1. Submit connection details to the cladding manufacturer, showing interface of rainscreen attachment system to substrate and panels with adjacent construction, signed and sealed by Professional Engineer.
  2. Show system installation and attachment, including fastener size and spacing.
- C. Structural Calculations:

1. Submit rainscreen attachment manufacturer's comprehensive Structural Design analysis signed and sealed by a Professional Engineer.
- D. Samples: Submit following material samples for verification:
  1. Wall Brackets: Two (2) samples.
  2. Horizontal Rails: Two (2) 12-inch long samples.
- E. Test Reports:
  1. Test to the following standards and provide written test reports by a third party:
    - a. AAMA TIR-A8-[04]: Structural Performance of Composite Thermal Barrier Framing Systems – Section 7.2.
  2. Comprehensive three-dimensional thermal modeling report indicating framing systems impact on exterior insulation rated R-value.

#### **1.4 QUALITY ASSURANCE**

- A. Manufacturer Qualifications:
  1. Minimum 5 years' experience specializing in the manufacturing of façade attachment/support framing similar to those specified.
  2. Ability to demonstrate conformance to testing requirements.
- B. Installer Qualifications:
  1. Minimum of 3 years' documented experience or minimum of 5 completed projects of equivalent scope and quality and recommended by manufacturer to perform work of this Section.
  2. Onsite superintendent or foreman overseeing installation on site during entire work of this Section with experience equivalent to installer and in good standing with the manufacturer.
- C. Engineer Qualifications: Registered professional engineer experienced in the design of curtain wall systems, anchors, fasteners and licensed to practice engineering in the jurisdiction where Project is located.
- D. Pre-Installation Meeting:
  1. Discuss sequence and scheduling of work and interface with other trades.
  2. Review metal wall framing assemblies for potential interference and conflicts and coordinate layout and support provisions for interfacing work.
  3. Review and document methods, procedures and manufacturer's installation guidelines and safety procedures for exterior wall assembly.
- E. Mock-Ups: Coordinate mock-up materials and requirements with mock-up specified in Division 01 [and exterior cladding specification].

#### **1.5 QUALITY CONTROL**

- A. Single source responsibility:
  1. Furnish engineered rainscreen attachment system components under direct responsibility of single manufacturer.
- B. Field Measurements: Verify actual supporting and adjoining construction before fabrication.
- C. Record field measurements on project record shop drawings.

- D. Established Dimensions: Where field measurements cannot be made without delaying work, guarantee dimensions and proceed with fabrication of rainscreen attachment system corresponding to established dimensions.

## **1.6 DELIVERY, STORAGE AND HANDLING**

- A. Delivery: Deliver materials and components in manufacturers' original, unopened and undamaged containers or bundles, fully identified. Exercise care to avoid damage during unloading, storing and installation.
- B. Store, protect and handle materials and components in accordance with manufacturer recommendations to prevent damage, contamination and deterioration. Keep materials clean, dry, and free of dirt and other foreign matter, and protect from damage due to weather or construction activities.

## **1.7 SEQUENCING**

- A. Ordering: Comply with manufacturers' ordering instructions and lead time requirements to avoid construction delays.
- B. Coordinate construction to ensure that assemblies fit properly to supporting and adjoining construction; coordinate schedule with construction in progress to avoid delaying work.

## **1.8 WARRANTY**

- A. Manufacturer Warranties:
  - 1. Attachment System: Ten (10) year Limited Warranty.
    - a. Covers components of the attachment system, including structural failure of components when all the materials and components are supplied and installed per manufacturer's requirements.
    - b. Includes labor and material for removal and replacement of defective material.
    - c. Includes labor to remove and reinstall façade finish panels, finish closures and façade finish accessories necessary to access defective material.
- B. Contractor's Warranties: 2-year labor warranty, starting from [date of Owner acceptance of completed work] [Substantial Completion], to cover repair of materials found to be defective as a result of installation errors.
- C. Limitation of Warranties: Exclude repairs, replacement, and corrective work to the substrate, primary structure, finish panels, and/or property – unless otherwise noted above. Warranties exclude mechanical damage due to abuse, neglect, primary structure failure, or forces of nature greater than normal weather conditions.

## **1.9 MAINTENANCE**

- A. Extra Materials: For use by Owner in building maintenance and repair, provide [a recommended percentage of] [3 percent] additional rainscreen attachment components in new, unopened cartons, packaged with protective covering for storage and identified with appropriate labels.

## **PART 2 - PRODUCTS**

### **2.1 RAINSCREEN ATTACHMENT/SUPPORT FRAMING SYSTEM**

- A. Comply with ANSI/ASHRAE 90.1-2010.

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- B. Coating Material: ASTM A1046, Zinc-Aluminum-Magnesium, minimum thickness ZM40.
  - 1. ASTM A653 Galvanized steel is not acceptable.
- C. Steel Classification: Structural Steel (SS), Grade 50, 50 ksi Yield.
- D. Spacing: Comply with manufacturer's Professional Engineer's project specific calculations.
- E. Wall Brackets:
  - 1. Minimum 0.074 inch thick (14 gauge) sheet steel.
  - 2. Dimensions:
    - a. Bracket Base: Minimum 3.125 inch high by 2.125 inch wide.
    - b. Offset Brackets: 2- [3-] [3.5-] [4-] [5-] [6-] inch depth.
      - 1) Align offsets to differing wall planes as shown on Drawings.
  - 3. Pre-Punched Holes: Two wall anchors per bracket.
  - 4. Recommended Product: ThermaBracket-S by Knight Wall Systems or approved equal.
- F. Primary Horizontal [Vertical] Rail, Static S-Series.
  - 1. Minimum 0.046-inch thick (18 gauge) [0.054-inch thick (16 gauge)] cold-formed steel.
  - 2. Profile: C channel, two flanges of equal length and one web.
  - 3. Nominal Dimensions: Minimum 1.0 inch flange for attaching to wall bracket and 1.625 inch at web.
  - 4. Pre-Punched Attachment Holes: 1.0 inch on center along length of track and oversized allowing for thermal contraction and expansion of rail without placing stress on brackets.
  - 5. Recommended Product: S-Rail by Knight Wall Systems or approved equivalent.
- G. Secondary Vertical [Horizontal] Rail: Nominal 0.046 inch thick (18 gauge) [0.054-inch thick (16 gauge)] cold-formed steel.
  - 1. Profile: Hat channel with stiffening lips.
  - 2. Profile Depth: 0.75 inches.
  - 3. Girt Fastening Face: 2.0 inches [3.0 inches] [4.0 inches] [5.0 inches] [Manufacturer's recommendation as Engineered].
  - 4. Weep Drains: 0.75 inches diameter at 4 inches on center along flanges to allow for free air flow laterally.
  - 5. Attachment Holes: Locate at 2 inch on center along back to facilitate number 14 self-drilling self-tapping screw attachment to primary rail.
    - a. Oversize holes to allow for thermal contraction and expansion of rail.
  - 6. Basis of Design: PanelRail™ by Knight Wall Systems.
  - 7. Or approved equal.
- H. Reveal Rail: Nominal 0.046 inch thick (18 gauge) [0.054-inch thick (16 gauge)] cold-formed steel.
  - 1. Profile: Square hat channel with stiffening lips.
  - 2. Depth: 0.75 inches.
  - 3. Dimensions: 2.0 inches at web, 1.625 inches at each flange with 0.25 stiffening lips.
  - 4. Basis of Design: RevealRail™ by Knight Wall Systems or approved equivalent.
- I. Thermal Isolation:

1. Material: Injection molded Polyoxymethylene copolymer (POM), non-fiber reinforced.
2. Tensile Yield Strength: 9.57 ksi per ISO 527.
3. Melting Temperature: 329 degrees Fahrenheit per ISO 3146.
4. Components:
  - a. Wall Anchor Isolation Washer: minimum 0.125 inch thick.
  - b. Support Wall Substrate Isolation: Minimum 0.375-inch thick at each wall bracket.
  - c. Rail to Bracket Isolation: Minimum 0.125 inch thick at each connection.
  - d. Bracket Shim: Match support wall substrate isolator profile; available in 0.125-inch thickness and does not decrease thermal or structural performance of system.
5. Basis of Design: ThermaStop™ Isolators by Knight Wall Systems.
6. Or approved equal.

J. Fasteners:

1. Sufficient length to provide solid attachment to structure as required by manufacturer.
2. Thermally isolated.
3. Framed substrate with sheathing: Self-drill hex-washer-head stainless steel with 1,000 hour salt-spray rated thermoset polyester coating.
  - a. Embedment depth: 0.625 inches or three full threads minimum, whichever is greater.
  - b. Minimum ultimate pull-out capacity from 18 gauge steel: 450 pounds.
4. Concrete and concrete masonry units substrate:
  - a. Embedment depth: 1.25 inches minimum.
  - b. Minimum ultimate pull-out capacity from substrate material: 450 pounds.
  - c. 1/4 inch Kwik-Con II+ by Hilti
  - d. 1/4 inch Tapcon by Buildex
  - e. 1/4 inch UltraCon by Elco Industries
  - f. Or approved equal.
5. For primary to secondary rail connection: Self-drill hex-washer-head stainless steel with 1,000 hour salt-spray rated thermoset polyester coating.
  - a. Embedment depth: 0.625 inches or three full threads minimum, whichever is greater.
  - b. Minimum ultimate pull-out capacity from 18 gauge steel: 450 pounds.

K. Accessories:

1. Bracing, Furring, Bridging, Plates, Gussets, and Clips: Formed sheet steel, thickness as necessary to meet structural requirements for special conditions encountered.
2. Galvanic Protection: Utilize tapes and other methods as necessary to separate and prevent contact between dissimilar metals.

## 2.2 MINERAL FIBER INSULATION

- A. Refer to Section 07 21 00 – Thermal Insulation.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine substrates and conditions for compliance with manufacturer requirements for installation conditions affecting performance of the work.
  - 1. Do not proceed with installation until unsatisfactory conditions have been corrected.
  - 2. Ensure weather-resistant barrier (WRB) is installed prior to installing rainscreen attachment system.
  - 3. Ensure fenestration, transitions, discontinuities, sills, and ledgers are flashed and sealed to move moisture to the exterior of the building.
- B. Field verify architectural details and mechanical and electrical requirements prior to commencing installation.
- C. Commencement of installation constitutes acceptance of existing conditions and acceptance of responsibility for satisfactory performance.

### **3.2 RAINSCREEN ATTACHMENT SYSTEM INSTALLATION**

- A. Preparation: Review areas of potential interference and conflicts and coordinate layout and support provisions for interfacing work.
- B. Installation: Install in strict accordance with manufacturer's installation instructions.
- C. Wall Brackets and Primary Rail:
  - 1. Mount wall brackets at 16 [24] [32] inch on center horizontally [vertically] on support wall (at each stud location).
    - a. Brackets must be laid out at 0.5 inch increments vertically or horizontally.
    - b. Tighten screws to substructure to a snug tight condition and not stripped. Do not over-torque beyond manufacturer's recommendation. If installed using hand tools, verify for each installer at beginning of project using snug-tight criteria. Do not use stripped holes.
  - 2. Thermally isolate wall bracket attachments by sandwiching thermal break material between metal bracket and support wall substrate.
  - 3. Thermally isolate screw fastener washers using material to thermally isolate fastener heads from metal bracket.
  - 4. Mineral Fiber Insulation: Install to expand into and friction fit between wall brackets as specified by Section 072100 prior to installing horizontal rails.
  - 5. Attach horizontal rail to wall bracket stem by use of a self-tapping screw fastener through the pre-punched holes in the rail and into the pre-punched pilot holes on the bracket.
  - 6. Isolate horizontal rail from bracket by sandwiching a thermal break material between rail and bracket stem.
  - 7. Attach horizontal rail at proper pre-punched pilot holes on bracket stem to align plumb and true. Account for irregularities in support wall.
  - 8. Establish and re-establish and restart vertical bracket locations using laser or chalk-line at fenestrations and other obstructions to establish horizontal alignments.
- D. Secondary Rail:

1. Space to make suitable bearing surfaces for each cladding system as instructed by manufacturer and as shown on Architect accepted shop drawings.
  2. Begin at bottom and mount to horizontal rails using No. 14 self-drilling self-tapping stainless steel screws.
  3. Tighten screws to snug tight. Verify equivalent snug tight condition for installers using hand tools.
  4. Install successive vertical rails as required for panel type and engineering.
  5. When encountering fenestrations and other openings, mount vertical rails so that fastening points are as close to the lower and upper edges as possible.
- E. Touch-up shop-applied protective coatings damaged during handling and installation.
- F. Use shearing instruments (i.e. snips, nibbler, etc.) for cutting metal framing components. Saws are not recommended, as the sparks produced during cutting will damage the anti-corrosion coating. If sparks are generated during cutting, be sure the portion of the component to be installed on the building is protected from sparks and that any stockpile near the cutting station is also protected.
- G. The systems components should not be cut while installed on the building, unless using a shearing instrument.
- H. Replace thermal isolator pieces that break during installation.
- I. Provide a 3/8" – 1/2" gap between girts for expansion when multiple lengths of rail are installed.
- J. Minimum length of installed cut primary rail is 12" and must be attached to at least two separate wall brackets to prevent rotation of rail. Unsupported cantilever must not exceed 6" unless specified differently by manufacturer's engineer.
- K. Minimum length of installed cut secondary rail is 12" and must be mechanically attached to at least two separate primary rails.

### **3.3 ERECTION TOLERANCES**

- A. Maximum Framing Member Variation from True Position: 1/4 inch.
- B. Maximum Framing Member Variation from Plane:
1. Individual Framing Members: Do not exceed 1/4 inch in 10 foot.
  2. Accumulative Over-all Variation for Wall and Floor System: Do not exceed 1/4 inch.

### **3.4 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Technical Service: Make intermittent and final inspection to verify installation in conformance to manufacturer instructions and suitable as framing assembly for subsequent metal panels, acrylic plastering, and other cladding installations.
1. Confirm snug tight and fastener sizing.
  2. Confirm framing members installed in correct orientation.

### **3.5 ADJUSTING**

- A. Inspect and adjust after installation. Replace or repair defective work.
- B. Adjust, and reconfigure as necessary to accommodate cladding systems for installations over work of this Section. Do not reuse pre-drilled holes unless fastener size is increased.

### **3.6 SIDING/CLADDING PANEL INSTALLATION –**

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- A. The cavity must be clear and free from air flow and drainage obstructions.

**END OF SECTION**

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**2019-07-26**

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## SECTION 07 5216

### MODIFIED BITUMINOUS MEMBRANE ROOFING

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes: SBS-modified bituminous membrane roofing system and supplementary items necessary for installation.

##### 1.2 ALLOWANCES

- A. Concrete Moisture Barrier Allowance: Include allowance to provide Concrete Moisture Barrier Treatment at concrete roof deck.
  - 1. If Concrete Moisture Barrier Treatment is provided, delete Vapor Retarder sheet from roofing assembly.

##### 1.3 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing Work in this Section.
- B. Roof Edge Regions: The following definitions from ANSI/SPRI ES-1 shall be applicable to this project.
  - 1. Roof Corner Region: Based on the following:
    - a. For buildings with mean roof height of 60 ft (18 m) or less, the corner region is a distance from the building corner that is 10 percent of the minimum building width or 40 percent of the building height at the eaves, whichever is smaller, but not less than 4 percent of minimum building width and not less than 3 ft (0.9 m).
    - b. For buildings with mean roof height greater than 60 ft (18 m), the corner region is a distance from the building corner that is 10 percent of the minimum building width but not less than 3 ft (0.9 m).
  - 2. Roof Perimeter: The section of the roof edge between corner regions as defined above. The edge condition includes the roof edge device (edge flashing or coping) and the nailers or other substrate to edge device is attached.
- C. SBS: Styrene-butadiene-styrene.

##### 1.4 ACTION SUBMITTALS

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.

- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.
  - 1. Show base flashings, cants, and membrane terminations.
  - 2. Show flat and sloped tapered insulation, including slopes.
  - 3. Show crickets and saddles, including slopes.
  - 4. Show roof plan showing orientation of roofing ply sheets and fastener spacing.
  - 5. Show insulation fastening patterns for corner, perimeter, and field-of-roof locations.
  - 6. Show cold-applied adhesive pattern for insulation installation; typical pattern of a 100 square foot area.
- C. Samples for Verification Purposes: For the following products:
  - 1. Roofing membrane cap sheet, 12 in by 12 in (300 mm by 300 mm) square of color specified.
  - 2. Flashing sheets.
  - 3. Vapor Retarder, 12 in by 12 in (300 mm by 300 mm) square.
  - 4. Roof insulation.
  - 5. Walkways and protection course.
  - 6. Termination bars.
  - 7. Fasteners of each type, length, and finish.
  - 8. Decorative aggregate, 10 lbs (4.5 kg) of aggregate in gradation and color indicated.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
- B. Notice of Acceptance Reports: Submit valid Product Control Notice of Acceptance (NOA) issued by Miami-Dade County Building Code Compliance Office (BCCO) for systems used at exterior of building.
- C. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".
- D. Concrete Roof Deck - Moisture Content Measurement: If requested by Owner or Architect, submit recorded readings.
- E. Substrate Surface Temperature Readings at Cold Fluid-Applied Insulation Adhesive: If requested by Owner or Architect, submit recorded readings.
- F. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.
- G. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
- H. Warranty: Sample of warranty.

1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations, and exclusions.

## **1.6 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: To include in maintenance manuals.

## **1.7 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 10 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Installer Qualifications:
  1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
  3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.
- C. Insurance Certification: Assist Owner in preparing and submitting roof installation acceptance certification as necessary in connection with fire and extended-coverage insurance on roofing and associated work.
- D. Quality Standards:
  1. Unless otherwise recommended by roofing system manufacturer, provide roofing system in accordance with recommendations of the NRCA "Roofing and Waterproofing Manual" for roofing type indicated.
  2. Comply with FMG System Loss Prevention Data Sheet 1-49 for attachment and anchorage of nailers, blocking, and other associated members for applicable wind zone for Project.
  3. Comply with FMG System Loss Prevention Data Standards 1-28 and 1-28S for attachment and anchorage of roof insulation to metal decking.
- E. Fire-Test-Response Characteristics: Provide roofing system materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.
  1. Exterior Fire-Test Exposure: ASTM E 108, Class A, for application and roof slopes indicated.
  2. Fire-Resistance Ratings: ASTM E 119, for fire-resistance-rated roof assemblies of which roofing system is a part.

## **1.8 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

1. Participants:
  - a. Architect.
  - b. Contractor, including superintendent.
  - c. Installer, including project manager and supervisor (superintendent).
  - d. If requested, Manufacturer's qualified technical representative.
  - e. Installers of other construction interfaced with Work.
  - f. Testing agency.
2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
  - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
  - b. Review Contract Document requirements.
  - c. Review approved submittals.
  - d. Review inspection and testing requirements.
  - e. Review environmental conditions and procedures for coping with unfavorable conditions.
  - f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications
  - g. Review deck substrate requirements for conditions and finishes, including flatness, presence of moisture, and fastening.
  - h. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
  - i. Review governing regulations and requirements for insurance and certificates if applicable.
  - j. Review temporary protection requirements for roofing during and after installation.
  - k. Review roof observation and repair procedures after roofing installation.
3. Record discussions, including decisions and agreements, and prepare report.

#### **1.9 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials and place equipment in a manner to avoid significant or permanent damage to deck or structural supporting members.

#### **1.10 PROJECT CONDITIONS**

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to roofing system manufacturer's written instructions and warranty requirements.

#### **1.11 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

#### **1.12 WARRANTY**

- A. Manufacturer's Warranty: Furnish manufacturer's written "Total Roofing System" warranty signed by an authorized representative using manufacturer's standard form, without monetary limitation (NDL), agreeing to repair or replace components of roofing system which exhibit defects in materials or workmanship within specified warranty period. "Defects" is defined to include, but not limited to, deterioration or failure to perform as required.
  - 1. Warranty includes roofing, flashings, adhesives, sealants, insulation, fastener systems, cover boards, substrate board, and other components of roofing system.
  - 2. Warranty shall also include lightweight insulating concrete substrate.
  - 3. Warranty Period: 20 years from date of Substantial Completion.
- B. Installer's Warranty: Furnish installer's written warranty signed by an authorized representative using installer's standard form agreeing to repair or replace components of roofing system which exhibit defects in materials or workmanship within specified warranty period. "Defects" is defined to include, but not limited to, deterioration or failure to perform as required.
  - 1. Warranty includes roofing, flashings, adhesives, sealants, insulation, fastener systems, cover boards, substrate board, and other components of roofing system.
  - 2. Warranty includes roof edge flashings integral with roofing system as specified in Division 07 Section "Flashing and Sheet Metal".
  - 3. Warranty Period: 2 years from date of Substantial Completion.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".

#### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

#### **2.3 PERFORMANCE REQUIREMENTS**

- A. General Performance: Installed roofing system and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing system and base flashings shall remain watertight.
- B. Design Loads: Installed roofing system and base flashings shall withstand design loads including, but not limited to, requirements established by authorities having jurisdiction, applicable local building codes, and as indicated. Contractor shall obtain required design data and identify requirements accommodated on submittal drawings.
- C. Material Compatibility: Provide roofing system materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing system manufacturer based on testing and field experience.
- D. Edge Systems Design: Provide edge systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to SPRI's "Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems" ES-1.
- E. Roofing System Design: Provide roofing systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure and external fire exposure.
- F. FMG Listing: Provide roofing system, base flashings, and component materials that comply with requirements in FMG 4450 and FMG 4470 as part of a roofing system and that are listed in FMG Approval's "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG Approvals markings.
  - 1. Fire/Windstorm Classification at Roof Corner and Perimeter Region: Class 1A-150.
  - 2. Fire/Windstorm Classification at Field of Roof: Class 1A-90.
- G. NOA Listing: Provide roofing system, base flashings, and component materials that comply with requirements in Notice of Acceptance as part of a roofing system, including but not limited to, fire resistance, physical properties, pull-through resistance, and wind and wind driven rain resistance in accordance with requirements of authorities having jurisdiction.
- H. Energy Performance for Low Slope Roofs: Provide roofing system with initial Solar Reflectance Index not less than 78 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.
- I. Energy Performance: Provide roofing system that is listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.
- J. Energy Performance: Provide roofing system with initial solar reflectance not less than 0.70 and emissivity not less than 0.75 when tested according to CRRC-1.

## **2.4 MODIFIED BITUMINOUS MEMBRANE ROOFING SHEET MATERIALS**

- A. Vented Base Sheet: ASTM D 4897, Type II, venting, non-perforated, heavyweight, asphalt-impregnated and coated, glass-fiber base sheet with coarse granular surfacing or embossed venting channels on bottom surface; for mechanically fastening to lightweight insulating concrete substrate.

- B. Base Sheet: Complying with specified products, provide one of the following as suitable for application method and performance requirements:
- C. Intermediate Sheet: Complying with specified products, provide one of the following as suitable for application method and performance requirements:
  - 1. ASTM D 6162, Grade S, Type I or II, composite polyester- and glass-fiber-reinforced.
  - 2. ASTM D 6163, Grade S, Type I or II, glass-fiber-reinforced.
  - 3. ASTM D 6164, Grade S, Type I or II, polyester-reinforced.
- D. Cap Sheet: Factory-surfaced with ceramic-coated roofing granules, subject to prior review and acceptance by Architect.
  - 1. Complying with specified products, provide one of the following as suitable for application method and performance requirements:
    - a. ASTM D 6162, Grade G, Type I or II, composite polyester- and glass-fiber-reinforced.
    - b. ASTM D 6163, Grade G, Type I or II, glass-fiber-reinforced.
    - c. ASTM D 6164, Grade G, Type I or II, polyester-reinforced.
  - 2. Manufacturers and Products:
    - a. Heat-weld Cap Sheet Installation:
      - 1) GAF; Ruberoid SBS Heat-Weld Plus FR or Ruberoid SBS Heat-Weld 170 FR.
      - 2) Johns Manville, Inc.; DynaWeld Cap FR.
      - 3) Siplast; Paradiene 30 FR TG.
      - 4) Soprema; Elastophene Flam HR FR GR, Elastophene Flam LS FR GR, or Sopralene Flam 180 FR GR.
- E. Metal-Foil-Surfaced Flashing Sheet: ASTM D 6298, metal-foil surfaced SBS-modified asphalt sheet (reinforced with glass fibers); suitable for application method specified, and as follows:
  - 1. Foil Surfacing: Aluminum.
  - 2. Manufacturers and Products:
    - a. GAF; Ultraclad Foil Faced SBS.
    - b. Johns Manville, Inc.; DynaClad.
    - c. Siplast; Veral Aluminum System.
    - d. Soprema; Sopralast series.
- F. Granular-Surfaced Flashing Sheet: SBS-modified asphalt sheet; surfaced as cap sheet; suitable for application method specified.
  - 1. Complying with specified products, provide one of the following as suitable for application method and performance requirements:
    - a. ASTM D 6162, Grade G, Type I or II, composite polyester- and glass-fiber-reinforced.
    - b. ASTM D 6163, Grade G, Type I or II, glass-fiber-reinforced.

- c. ASTM D 6164, Grade G, Type I or II, polyester-reinforced.

- 2. Color: Match roofing membrane cap sheet.

## **2.5 MODIFIED BITUMINOUS MEMBRANE ROOFING SYSTEM AUXILIARY MATERIALS**

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing membrane. Liquid-type auxiliary materials shall meet VOC limits of authorities having jurisdiction.

- 1. Asphalt Primer: ASTM D 41.

- B. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required by roofing system manufacturer for application method.

- C. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roofing membrane components to substrate, tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.

- D. Liquid-Applied Reinforced Membrane Flashing: Bonded to base of pipe and stack, including roof and overflow drains, as recommended by roofing system manufacturer.

- 1. Manufacturers and Products:

- a. GAF; MajorSeal Flashing System.
- b. Johns Manville, Inc.; PermaFlash Bituminous Flashing System.
- c. Siplast; Parapro 123 Flashing System.
- d. Soprema; Alsan Flashing System.

- E. Metal Flashing Sheet: Metal flashing sheet is specified in Division 07 Section "Flashing and Sheet Metal".

- F. Roofing Granules: Roofing granules, color and size to match cap sheet roofing membrane.

- G. Termination Bars: ASTM A 666, Type 304 formed stainless steel or extruded alloy 6063 aluminum bars; 2 types, one flat and one flat with upper flange shaped to receive sealant, locations as indicated; 1 in by 1/8 in (25 mm by 3 mm) thick; predrilled at 8 in (200 mm) centers; with corrosive resistant fasteners. No plastic bars allowed.

- H. Miscellaneous Accessories: Provide miscellaneous accessories recommended by roofing system manufacturer.

## **2.6 CONCRETE MOISTURE BARRIER TREATMENT**

- A. Concrete Moisture Barrier Treatment: Two-component, high-performance, non-flammable, rapid drying, water based, low odor, low VOC, penetrating epoxy; formulated to reduce moisture vapor transmission and surface alkalinity from concrete substrates, including aged or freshly placed ("green") concrete, prior to installation of roofing materials.

- a. Basis of Design (Product Standard): Aquafin, "Vaportight Coat SG3" or product acceptable to roofing manufacturer.

## **2.7 SUBSTRATE BOARDS FOR FIRE RESISTANCE**

A. Substrate Boards for Fire-Resistance: Select one of the following:

1. Gypsum Substrate Board: ASTM C 1396 / C 1396M, Type X, gypsum board with water-resistant-treated core and with water-repellent paper bonded to core's face, back, and long edges, 5/8 in (15 mm) thick.
2. Glass-Faced Substrate Board: ASTM C 1177 / C 1177M, Type X, glass-mat, water-resistant exterior gypsum sheathing board specifically manufactured for use beneath roofing systems, 5/8 in (15 mm) thick.

a. Manufacturers and Products:

- 1) Georgia-Pacific Gypsum LLC; DensDeck FireGuard Prime.

3. Exterior Gypsum Substrate Board: ASTM C 1278 / C 1278M, Type X, exterior gypsum sheathing board specifically manufactured for use beneath roofing systems. Non-combustible, cellulosic-fiber-reinforced, moisture-resistant gypsum core, 5/8 in (15 mm) thick.

a. Manufacturers and Products:

- 1) USG; SECUROCK Gypsum-Fiber Roof Board.

## **2.8 VAPOR RETARDER**

A. Vapor Retarder: SBS-modified asphalt sheet, smooth surfaced. Provide one of the following; suitable for application method and performance requirements:

1. ASTM D 6162, Grade S, Type I or II, composite polyester- and glass-fiber-reinforced.
2. ASTM D 6163, Grade S, Type I or II, glass-fiber-reinforced.
3. ASTM D 6164, Grade S, Type I or II, polyester-reinforced.

B. Vapor Retarder Substrate Board: Same product as roof cover board, 1/2 in (12 mm) thickness, specified elsewhere in this Section.

## **2.9 ROOF INSULATION AND ACCESSORIES**

A. Insulation Board at Lightweight Insulating Concrete Substrate: Refer to Division 03 Section "Lightweight Insulating Concrete" for insulation board embedded in concrete slurry.

B. General: Provide preformed roof insulation boards that comply with requirements of referenced standards, selected from manufacturer's standard sizes and thicknesses. Provide accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.

1. Provide insulation thickness required to maintain minimum aged R-value of 30.
2. Insulation board thickness of individual insulation layers to be 2 in (50 mm) maximum.
3. Insulation board size to be 4 ft by 4 ft (1.22 m by 1.22 m) maximum.
4. Provide factory, tapered insulation boards where indicated for sloping to drain. Fabricate with 1/4 in (6 mm) in per 12 in (300 mm) (1:48) taper, unless otherwise indicated.

5. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.
- C. Polyisocyanurate Board Insulation: Rigid, cellular polyisocyanurate thermal insulation with core formed by using HCFCs as blowing agents to comply with ASTM C 1289, Type II, Class 2, Grade 2, (20 psi compressive strength), except product to include only glass-fiber mat on both major surfaces.
  - D. Polyisocyanurate Board Insulation: Rigid, cellular polyisocyanurate thermal insulation with core formed by using HCFCs as blowing agents to comply with ASTM C 1289, Type II, Class 2, Grade 3, (25 psi compressive strength), except product to include glass-fiber mat on both major surfaces.
  - E. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.
  - F. Treated Wood Nailers and Cant Strips: As specified in Division 06 Section "Miscellaneous Rough Carpentry".

## **2.10 ROOF ACCESSORIES**

- A. Treated Wood Nailers and Cant Strips: As specified in Division 06 Section "Miscellaneous Rough Carpentry".

## **2.11 ROOF COVER BOARDS**

- A. Horizontal Roof Cover Boards: Glass-Mat Faced Exterior Gypsum Sheathing Board.
  1. Material Quality Standard: ASTM C 1177 / C 1177M.
  2. Description: Glass-mat faced exterior gypsum sheathing board specifically manufactured for use beneath roofing systems. Non-combustible moisture-resistant gypsum core with glass-mat facings. Provide in maximum lengths and widths available that will minimize short-edge-to-short-edge butt joints and to correspond to support system indicated.
  3. Manufacturers and Products:
    - a. Georgia-Pacific Gypsum LLC; DensDeck Prime.
  4. Thickness: Minimum 1/4 in (6 mm); or as required to meet performance requirements.
  5. Thickness: Minimum 1/2 in (12 mm); or as required to meet performance requirements.
- B. Horizontal Roof Cover Boards: Exterior Gypsum Sheathing Board.
  1. Material Quality Standard: ASTM C 1278 / C 1278M.
  2. Description: Exterior gypsum sheathing board specifically manufactured for use beneath roofing systems. Non-combustible, cellulosic-fiber-reinforced, moisture-resistant gypsum core. Provide in maximum lengths and widths available that will minimize short-edge-to-short-edge butt joints and to correspond to support system indicated.
  3. Manufacturers and Products:
    - a. USG; SECUROCK Gypsum-Fiber Roof Board.

4. Thickness: Minimum 1/4 in (6 mm); or as required to meet performance requirements.
  5. Thickness: Minimum 1/2 in (12 mm); or as required to meet performance requirements.
- C. Vertical Cover Boards (Back of Parapet): As specified in Division 06 Section "Exterior Gypsum Sheathing".

## **2.12 WALKWAYS AND PROTECTION COURSE**

- A. Modified Bitumen Protection Course: SBS-modified asphalt cap sheet, granular surfaced; suitable for application method.
1. Basis of Design (Product Standard): Siplast; Paratread System.
  2. Granule Color: As selected from manufacturer's standard colors, different from roof membrane color.
  3. Location: Pathways and surrounding rooftop-mounted equipment as indicated on roof plan
- B. Composition Protection Course: Mineral-granule-surfaced, reinforced composition pads, suitable for application method and acceptable to roofing system manufacturer, thickness as required 1/4 in (6 mm) minimum).
1. Basis of Design (Product Standard): Siplast; Trafbloc System.
  2. Granule Color: As selected from manufacturer's standard colors, different from roof membrane color.
  3. Location: Sleepers, bracings, and other rooftop equipment not mounted to roof deck.

## **2.13 FLASHING AND SHEET METAL**

- A. Flashing and Sheet Metal: Refer to Division 07 Section "Sheet Metal Flashing Trim".

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions, including concrete moisture content, have been corrected in a manner complying with roofing manufacturer recommendations and Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.
1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
  2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thickness of insulation.
  3. Metal Decking Substrates:
    - a. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Division 05 Section "Steel Roof Decking".

4. Cast-in-Place Concrete or Composite Metal Deck Substrates:

- a. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
- b. Concrete Moisture Testing: Perform one or both of the following tests as recommended by roofing manufacturer. Proceed with installation only after concrete substrates pass testing.
  - 1) Relative Humidity Test: As recommended by NRCA, perform moisture test using in situ probes in accordance with ASTM F 2170. Concrete to be drilled and probes inserted for minimum of 48 hours. Proceed with installation only after concrete substrates have a maximum 75 percent relative humidity level measurement or at a level acceptable to roofing manufacturer. Perform 3 moisture tests for first 1000 sf (92.9 sm) of concrete substrate scheduled to receive roofing and 1 test for each additional 1000 sf (92.9 sm) or fraction thereof.
  - 2) Manufacturer's Concrete Moisture Test: Roofing manufacturer's standard moisture test with measurements or results acceptable to roofing manufacturer.
- c. Moisture Treatment: For concrete substrates not meeting moisture test standards specified above, apply epoxy-based moisture mitigation treatment to concrete substrate in accordance with manufacturer's written instructions.
- d. Verify that concrete curing compounds that will impair adhesion of roofing components to roof deck have been removed.

5. Lightweight Insulating Concrete substrates:

- a. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
- b. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method according to ASTM D 4263 or as recommended by roofing manufacturer.

- B. Substrate Surface Temperature at Cold Fluid-Applied Insulation Adhesive: Confirm that concrete substrate or substrate board surface temperature is a minimum 50 deg F (10 deg C) prior to application of adhesive.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer's written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

- C. Pitch Pockets (aka Pitch Pans) at Roof Penetrations: Pitch pockets (aka pitch pans) at roofing penetrations are not allowed and will be considered non-conforming work. Refer to the drawings for allowable roof penetration details.

### **3.3 PREPARATION**

- A. General: Comply with roofing system manufacturer's instructions, recommendations and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
- B. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- C. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- D. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
- E. Install acoustical roof deck rib insulation strips, specified in Division 05 Section "Steel Decking," according to acoustical roof deck manufacturer's written instructions, immediately before installation of overlying construction and to remain dry.

### **3.4 SUBSTRATE BOARDS FOR FIRE RESISTANCE - INSTALLATION**

- A. Install substrate boards with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
  - 1. Fasten substrate boards to top flanges of steel deck according to recommendations in FMG Approvals' "RoofNav" and FM Global Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification.
  - 2. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturers' written instructions.

### **3.5 VAPOR RETARDER INSTALLATION**

- A. Vapor Retarder Substrate Board: Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
  - 1. Fasten substrate boards to top flanges of steel deck according to recommendations in FMG Approvals' "RoofNav" and FM Global Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification.
  - 2. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturers' written instructions.

- B. Vapor Retarder: Install according to roofing system manufacturer's written instructions, installing as follows:
  - 1. Heat-weld: Heat-weld to substrate.
- C. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into modified bituminous membrane roofing.

### **3.6 INSULATION INSTALLATION**

- A. General: Comply with FMG and roofing system manufacturer's written instructions for installing roof insulation. Secure insulation according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification.
- B. General: Comply with roofing system manufacturer's written instructions for installing roof insulation. Secure insulation to substrate to resist uplift pressure at corners, perimeter, and field of roof in accordance with performance requirements.
- C. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- D. Install tapered insulation under area of roofing to conform to slopes indicated.
- E. Install one or more layers of insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2 in (50 mm) or greater, install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 in (150 mm) in each direction.
- F. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- G. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 in (6 mm) with insulation. Cut and fit insulation within 1/4 in (6 mm) of nailers, projections, and penetrations.
- H. Cast-in-Place Concrete or Composite Metal Deck Substrate:
  - 1. Install and adhere base layer of insulation to substrate in a layer of cold fluid-applied adhesive. Install subsequent layers of insulation in a layer of cold fluid-applied adhesive.
- I. Steel Roof Deck Substrate: Provide one of the following methods according to performance criteria requirements for specified Windstorm Resistance Classification:
  - 1. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
  - 2. Mechanically Fastened and Adhered Insulation: Install base layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type. Install subsequent layers of insulation in a layer of cold fluid-applied adhesive.

- J. Substrate Board Substrate: Install and adhere base layer of insulation to substrate board in a layer of cold fluid-applied adhesive. Install subsequent layers of insulation in a layer of cold fluid-applied adhesive.

### **3.7 ROOF COVER BOARD INSTALLATION**

- A. General: Comply with FMG and roofing system manufacturer's written instructions for installing roof cover boards. Secure roof cover boards to insulation substrate according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification.
- B. General: Comply with roofing system manufacturer's written instructions for installing roof cover boards. Secure roof cover boards to insulation substrate to resist uplift pressure at corners, perimeter, and field of roof in accordance with Hurricane Design Performance requirements.
- C. Install roof cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 in (150 mm) in each direction. Loosely butt roof cover boards together.
  - 1. Provide one of the following fastening methods according to performance requirements:
    - a. Fasten roof cover boards through insulation into roof deck.
    - b. Adhere roof cover boards to insulation substrate in a layer of cold fluid-applied adhesive.
      - 1) Score boards, if necessary, to conform to substrate irregularities. Comply with manufacturer's installation recommendations to insure proper adhesion and adhesive set.
- D. Secure roof cover boards to insulation to resist uplift pressure at corners, perimeter, and field of roof according to membrane roofing system manufacturer's written instructions.

### **3.8 VENTING BASE-SHEET INSTALLATION**

- A. Install lapped base sheet course, extending sheet over and terminating beyond cants. Mechanically fasten to lightweight insulating concrete substrate according to roofing system manufacturer's written instructions.

### **3.9 MODIFIED BITUMINOUS MEMBRANE ROOFING SYSTEM INSTALLATION**

- A. Install roofing according to roofing system manufacturer's written instructions and applicable recommendations of ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing". Unroll roofing membrane sheets and allow them to relax for minimum time period required by manufacturer.
- B. Start installation of roofing system in presence of roofing system manufacturer's technical personnel.
- C. Cooperate with testing and inspecting agencies engaged or required to perform services for installing roofing system.

- D. Coordinate installing roofing system so insulation and other components of the roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when inclement weather is forecast.
  - 1. Provide tie-offs at end of each day's work to cover exposed roofing ply sheets and insulation with a course of coated felt set in roofing cement with joints and edges sealed.
  - 2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
  - 3. Remove and discard temporary seals before beginning work on adjoining roofing.
- E. Substrate-Joint Penetrations: Prevent roofing asphalt and adhesives from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.
- F. Install modified bituminous roofing base sheet and cap sheet according to roofing system manufacturer's written instructions, starting at low point of roofing system. Extend roofing sheets over and terminate beyond cants, installing as follows:
  - 1. Intermediate Sheets:
    - a. Heat-weld: Heat-weld to substrate.
  - 2. Base Sheets:
    - a. Heat-weld: Heat-weld to substrate.
  - 3. Cap Sheets:
    - a. Heat-weld: Heat-weld to substrate.
- G. Laps: Accurately align roofing sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Completely bond and seal laps, leaving no voids.
  - 1. Repair tears and voids in laps and lapped seams not completely sealed.
  - 2. Apply roofing granules/chips to cover extruded bead at laps while bead is hot.
- H. Install roofing sheets so side and end laps shed water.

### **3.10 BASE FLASHING AND STRIPPING INSTALLATION**

- A. Install base flashing over cant strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to roofing system manufacturer's written instructions and to meet warranty requirements:
  - 1. Prime substrates with asphalt primer if required by roofing system manufacturer.
  - 2. Flashing Sheet Application: Install as follows and in compliance with performance requirements:
    - a. Heat-weld flashing sheet to substrate.
- B. Extend base flashing up walls or parapets a minimum of 8 in (200 mm) above roofing and 4 in (100 mm) onto field of roofing.

- C. Using termination bars, mechanically fasten top of base flashing securely at terminations and perimeter of roofing.
- D. Install roofing cap-sheet stripping where metal flanges and edgings are set on roofing according to roofing system manufacturer's written instructions.
- E. Roof Drains: Set metal flashing in bed of asphalt roofing cement on completed roofing. Cover metal flashing with roofing cap-sheet stripping and extend a minimum of 4 in (100 mm) to 6 in (150 mm) beyond edge of metal flashing onto field of roofing. Clamp roofing, metal flashing, and stripping into roof-drain clamping ring. Install stripping according to roofing system manufacturer's written instructions.
- F. Liquid-Applied Reinforced Membrane Flashings: Liquid applied reinforced membrane bonded to base at pipe and stacks. Install according to roofing system manufacturer's written instructions.
- G. Protection Course for Lightning Protection System: Apply 12 in by 12 in (300 mm by 300 mm) additional layer of base flashing material over the vertical face of parapet for lightning protection system and as recommended by manufacturer.

### **3.11 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.
  - 1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.
- B. Testing Agency: The Owner may employ and pay a qualified independent testing agency to perform field quality control, including infrared inspections on installed roof assemblies. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense.
  - 1. Infrared Inspection: Where infrared survey indicates moisture intrusion, wet insulation and damaged or deficient materials or construction shall be replaced in a manner to provide watertight and specified wind uplift resistant construction, and maintain the roof system warranty.

### **3.12 REPAIR, CLEANING, AND PROTECTING**

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

- B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

**END OF SECTION**

## **SECTION 07 6200**

### **SHEET METAL FLASHING AND TRIM**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Flashing and sheet metal including assemblies listed below along with supplementary items necessary for installation:
  - 1. Reglets with counterflashing.
  - 2. Roof-drainage sheet metal fabrications.
  - 3. Steep-slope roof sheet metal fabrications.
  - 4. Embedded flashing.
  - 5. Equipment support flashing.
  - 6. Overhead-piping safety pans.
- B. Related Requirements:
  - 1. Refer to Division 6 Section "Rough Carpentry" for wood nailers, curbs, and blocking.
  - 2. Refer to Division 7 Section for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.

##### **1.2 DELEGATED ENGINEERING REQUIREMENTS FOR COPINGS AND GRAVEL GUARDS**

- A. Contract Documents Design Intent: Drawings and Specifications indicate design intent for products and systems and do not necessarily indicate or specify total Work required. Contract Documents shall not be construed as an engineered design; furnish and install all Work required for a complete installation.
- B. Delegated Engineering Responsibility: Contractor shall employ a qualified professional engineer to provide engineering for products and systems including attachment to building structure required to meet design intent of Contract Documents.
  - 1. Preparation of structural analysis data including engineering calculations, shop drawings and other submittals signed and sealed by the qualified professional engineer.
- C. Delegated Engineering Professional Qualifications: Professional engineer legally authorized to practice in jurisdiction where Project is located and experienced in providing engineering services of kind indicated for products and systems similar to this Project and has a record of successful in-service performance.
- D. Coordination of Work:
  - 1. Product Variations: In the event of minor differences between products and systems of acceptable or available manufacturers, Contractor shall notify Architect of such differences and resolve conflicts in a timely manner. Failure of Contractor to provide notification shall be construed as acceptance of conditions indicated, and changes caused by minor differences between products and Contract Documents shall be

- included in the Work at no additional cost to Owner.
2. Allowable Adjustments: Minor dimension and profile adjustments may be made in interest of fabrication or erection methods or techniques or ability to satisfy design intent, provided design intent is maintained as determined by Architect. Proposed deviations shall include a detailed analysis of impact to adjacent substrates or other building systems, including related design or construction cost impacts. If accepted by Architect, deviations causing changes in materials, constructability, substrates, or conditions shall be included in the Work at no additional cost to Owner.

### **1.3 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
- B. Shop Drawings: For sheet metal flashing and trim.
  1. Include plans, elevations, sections, and attachment details.
  2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
  3. Include identification of material, thickness, weight, and finish for each item and location in Project.
  4. Include details for forming, including profiles, shapes, seams, and dimensions.
  5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
  6. Include details of termination points and assemblies.
  7. Include details of roof-penetration flashing.
  8. Include details of special conditions.
  9. Include details of connections to adjoining work.
- C. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.
- D. Samples for Verification Purposes: Submit for items listed below; provide samples made from 12 in (300 mm) lengths of full-size components including fasteners, cover joints, accessories, and attachments.
  1. Sheet Metal Flashing: 12 in (300 mm) long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
  2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 in (300 mm) long and in required profile. Include fasteners and other exposed accessories.
  3. Unit-Type Accessories and Miscellaneous Materials: Full-size Sample.

### **1.4 INFORMATIONAL SUBMITTALS**

- A. Delegated Engineering Calculations: Structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation; test reports are not acceptable substitute for calculations.

- B. Product Certificates: For each type of coping and roof edge flashing that is SPRI ES-1 tested.
- C. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
- D. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.
- E. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
- F. Warranty: Sample of warranty.
  - 1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

### **1.5 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

### **1.6 QUALITY ASSURANCE**

- A. Manufacturer/Fabricator Qualifications: Manufacturer/shop-fabricator with not less than 5 years experience with successful production of products and systems similar to scope of this Project, with a record of successful in-service performance and completion of projects for a period of not less than 5 years, and with sufficient production capability, facilities, and personnel to produce required Work.
  - 1. For copings and roof edge flashings that are SPRI ES-1 tested, shop shall be NRCA listed or shall provide other evidence acceptable to Architect as able to fabricate required details as tested and approved.
- B. Installer Qualifications:
  - 1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  - 2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
- C. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.

### **1.7 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

1. Participants:
  - a. Architect.
  - b. Contractor, including superintendent.
  - c. Installer, including project manager and supervisor.
  - d. If requested, Manufacturer's qualified technical representative.
  - e. Installers of other construction interfaced with Work.
2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
  - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
  - b. Review Contract Document requirements.
  - c. Review approved submittals.
  - d. Review inspection and testing requirements.
  - e. Review environmental conditions and procedures for coping with unfavorable conditions.
  - f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
3. Record discussions, including decisions and agreements, and prepare report.

#### **1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.
- B. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing materials and fabrications away from uncured concrete and masonry.
- D. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

#### **1.9 PROJECT CONDITIONS**

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit flashing and sheet metal work to be performed according to manufacturer's written instructions and warranty requirements.
- B. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

## **1.10 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.
- 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.

## **1.11 WARRANTY**

- A. Installer's Warranty: Furnish installer's written warranty signed by an authorized representative using installer's standard form agreeing to repair or replace components of all sheet metal flashing assemblies that exhibit defects in materials or workmanship within specified warranty period. "Defects" is defined to include, but not limited to, deterioration or failure to perform as required.
  - 1. Warranty Period: 2 years from date of Substantial Completion.
- B. Factory Applied Finish Warranty: Furnish manufacturer's written warranty signed by an authorized representative using manufacturer's standard form agreeing to repair finish or replace work which exhibits finish defects. "Defects" is defined to include but not limited to deterioration or failure of finish to perform as required.
  - 1. Coverage includes but is not limited to the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  - 2. Warranty Period: Manufacturer shall warrant the installation to be free from finish defects for a period of 20 years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Available Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those listed.
  - 1. Manufacturers:
    - a. Cheney Flashing Company.
    - b. Fry Reglet Corporation.
    - c. Hickman Company, W. P.
    - d. Keystone Flashing Company, Inc.
    - e. MM Systems Corporation.
    - f. Petersen Aluminum Corporation.

## **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

## **2.3 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. Design Loads: Installed sheet metal flashing materials and fabrications shall withstand design loads including, but not limited to, requirements established by authorities having jurisdiction, applicable local building codes, and as indicated. Contractor shall obtain required design data and identify requirements accommodated on submittal drawings.
- C. Material Compatibility: Provide flashing and sheet metal materials that are compatible with one another and specified roofing system under conditions of service and application required, as demonstrated by manufacturer based on testing and field experience.
- 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.
- E. SPRI Wind Design Standard: Manufacture and install copings and roof edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressure:
  - 1. Design Pressure: As indicated on Drawings.
- F. 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 (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

## **2.4 SHEET METALS**

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
  - 1. Exposed Coil-Coated Finish:
    - a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers'

written instructions.

2. Color: As scheduled or as indicated in Drawings.
  3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil (0.013 mm).
- C. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304 , dead soft, fully annealed; with smooth, flat surface.
1. Finish: 2D (dull, cold rolled).
- D. Metallic-Coated Steel Sheet:
1. Zinc-coated (galvanized) steel sheet according to ASTM A 653/A 653M, G90 (Z275) coating designation.
  2. Aluminum-zinc alloy-coated steel sheet according to ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation, Grade 40 (Grade 275); prepainted by coil-coating process to comply with ASTM A 755/A 755M.
  3. Exposed Finish:
    - a. Surface: Smooth, flat.
    - b. Exposed Coil-Coated Finish:
      - 1) Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  4. Color and Gloss: As scheduled or as indicated in Drawings.
  5. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil (0.013 mm).

## **2.5 UNDERLAYMENT MATERIALS**

- A. Material Compatibility: Provide underlayment materials that are compatible with substrates and specified roofing system under conditions of service and application required, as demonstrated by manufacturer based on testing and field experience.
- B. Self-Adhering, High-Temperature Sheet Underlayment: Minimum 30 mils (0.76 mm) 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.
1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C) or higher.
  2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C) or lower.
  3. SBS-Modified Asphalt Adhesive based Manufacturers and Products:
    - a. Carlisle Coatings & Waterproofing; CCW WIP 300HT.

- b. Grace Construction Products, a unit of W. R. Grace & Co.; Ice and Water Shield HT.
  - c. Henry Company; Blueskin PE200 HT.
  - d. Metal-Fab Manufacturing, LLC; MetShield.
  - e. Owens Corning; WeatherLock Metal High Temperature Underlayment.
- 4. Butyl Adhesive based Manufacturers and Products:
  - a. Grace Construction Products, a unit of W. R. Grace & Co.; Ultra.
- 5. Primer: Provided by underlayment manufacturer.
- 6. Underlayment Sealing Tape: Provided by underlayment manufacturer.
- C. Slip Sheet: If recommended by manufacturer to separate sheet metal from underlayment; rosin-sized building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m) minimum.

## **2.6 MISCELLANEOUS MATERIALS**

- A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Manufacturer's recommended wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
  - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
    - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC 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.
  - 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
  - 3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
  - 4. Fasteners for Zinc-Coated (Galvanized) or Aluminum-Zinc Alloy-Coated Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.
- C. Solder:
  - 1. For Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
  - 2. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead with maximum lead content of 0.2 percent.
- D. Rubberized-Asphalt Flexible Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 in (1.02 mm).
  - 1. Manufacturers and Products:

- a. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
  - b. Dayton Superior Corporation, Dur-O-Wal Division; Dur-O-Barrier Thru-Wall Flashing.
  - c. Grace Construction Products, W.R. Grace & Co.-Conn.; Perm-A-Barrier Wall Flashing.
  - d. Heckmann Building Products, Inc.; No. 82 Rubberized-Asphalt Thru-Wall Flashing.
  - e. Hohmann & Barnard, Inc.; Textroflash.
  - f. W.R. Meadows, Inc.; Air-Shield Thru-Wall Flashing.
  - g. Polyguard Products, Inc.; Polyguard 400.
2. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.
- E. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 in (12 mm) wide and 1/8 in (3 mm) thick.
- F. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- G. Sealant for Use at Concealed Joints: Contractor's option, one of the following:
- 1. Butyl: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.
  - 2. Silicone: ASTM C 920, single-component, neutral cure silicone sealant.
- a. Basis of Design: Dow Corning; 758 Silicone Weather Barrier Sealant.
- H. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, or cold-applied asphalt emulsion complying with ASTM D 1187; compounded for 15 mils (0.4 mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- I. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

## **2.7 FABRICATION, GENERAL**

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
- 1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
  - 2. Obtain field measurements for accurate fit before shop fabrication.
  - 3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
  - 4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 in in 20 ft (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8 in (3 mm) offset of adjoining faces and of alignment of matching profiles.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 ft (3 m) with no joints within 24 in (600 mm) of corner or intersection.
- D. Sealant Joints: Where movable, non-expansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.
- G. Soldered Seams: Fabricate nonmoving seams with flat-lock seams except at corners. Rivet joints where necessary for strength
  - 1. Corners: Shop fabricate, factory mitered corners with continuously welded or soldered seams. Fabricate corners with no joints within 24 in (600 mm) of corner or intersection.
- H. Copings 12" Wide or Less: Form butted joints with expansion space and 12 in (300 mm) wide, concealed backup plate with double sealant on each side of joint.
- I. Copings Over 12" Wide: Form joints of intermeshing hooked flanges, not less than 1 in (25 mm) deep, filled with sealant concealed within joints.
- J. Do not use graphite pencils to mark metal surfaces.

## **2.8 SHEET METAL FLASHING AND TRIM**

- A. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated.
  - 1. Fabricate from the Following Materials, minimum thickness as indicated unless required otherwise to meet performance requirements.
    - a. Galvanized Steel: 0.028 in (0.7 mm) thick.
  - 2. Corners: Factory mitered, mechanically clinched and sealed watertight.
  - 3. Joints: Lapped, double seal with sealant.
  - 4. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
  - 5. Accessories:
    - a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.

- b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.
- 6. Finish: With manufacturer's standard color coating, unless indicated otherwise.

## **2.9 ROOF-DRAINAGE SHEET METAL FABRICATIONS**

- A. Hanging Gutters: Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96 in (2400 mm) long sections. Furnish flat-stock gutter brackets and gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard but with thickness not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters. Shop fabricate interior and exterior corners.
  - 1. Gutter Profile: As indicated on Drawings, according to cited sheet metal standard.
  - 2. Accessories: Wire-ball downspout strainer, Valley baffles.
  - 3. Gutters with Girth up to 15 in (375 mm): Fabricate from the following materials, minimum thickness as indicated unless required otherwise to meet performance requirements.
    - a. Aluminum: 0.032 in (0.8 mm) thick.
    - b. Galvanized Steel: 0.028 in (0.7 mm) thick.
    - c. Aluminum-Zinc Alloy-Coated Steel: 0.028 in (0.7 mm) thick.
  - 4. Gutters with Girth 16 to 20 in (400 to 500 mm): Fabricate from the following materials:
    - a. Aluminum: 0.040 in (1.0 mm) thick.
    - b. Galvanized Steel: 0.028 in (0.7 mm) thick.
    - c. Aluminum-Zinc Alloy-Coated Steel: 0.028 in (0.7 mm) thick.
  - 5. Corners: Factory mitered, mechanically clinched and sealed watertight.
  - 6. Joints: Lapped, double seal with sealant.
- B. Downspouts: Fabricate rectangular, unless indicated otherwise, downspouts to dimensions indicated, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors. Shop fabricate elbows. Size as recommended by SMACNA.
  - 1. Hanger Style: As indicated, according to SMACNA's "Architectural Sheet Metal Manual."
  - 2. Fabricate from the following materials, minimum thickness as indicated unless required otherwise to meet performance requirements.
    - a. ~~Copper: 16 oz./sq. ft. (0.55 mm thick).~~
    - b. Aluminum: 0.032 in (0.8 mm) thick.
    - c. Galvanized Steel: 0.028 in (0.7 mm) thick.
    - d. Aluminum-Zinc Alloy-Coated Steel: 0.028 in (0.7 mm) thick.
- C. Splash Pans: Fabricate to dimensions and shape required and from the following materials:
  - 1. Aluminum: 0.040 in (1.0 mm) thick.
  - 2. Corners and Joints: Factory mitered, solder or weld watertight.

## **2.10 LOW-SLOPE ROOF SHEET METAL FABRICATIONS**

- A. Roof Expansion-Joint Covers, 2 in (50 mm) and Less: Fabricate cap type expansion cover with continuous flanges to hold cap and serve as counter flashing. Form section not to exceed 12 ft

(3.6 m) in length and joint cap sections by standing seams held in place by cleats. Shop fabricate interior and exterior corners. Fabricate from the following materials, minimum thickness as indicated unless required otherwise to meet performance requirements.

1. Aluminum: 0.050 in (1.25 mm) thick.
2. Galvanized Steel: 0.034 in (0.86 mm) thick.
3. Aluminum-Zinc Alloy-Coated Steel: 0.034 in (0.8 mm) thick.
4. Joint Style: Standing seam and seal with sealant.
5. Corners: Factory mitered and mechanically clinched and sealed watertight.
6. Joints: Standing seam, seal with sealant.

B. Manufactured Roof Expansion Joint Cover Systems, 2 in (50 mm) and Greater:

1. Refer to Division 07 Section "Expansion Control" for manufactured roof expansion joint covers.

C. Counterflashing: Manufactured units of heights to overlap top edges of base flashings by 4 in (100 mm) and in lengths not exceeding 12 ft (3.6 m) designed to snap into through-wall-flashing receiver and compress against base flashings with joints lapped. Shop fabricate interior and exterior corners. Fabricate from the following materials, minimum thickness as indicated unless required otherwise to meet performance requirements.

1. Aluminum: 0.032 in (0.8 mm) thick.
2. Galvanized Steel: 0.028 in (0.7 mm) thick.
3. Aluminum-Zinc Alloy-Coated Steel: 0.028 in (0.7 mm) thick.
4. Corners: Factory mitered and mechanically clinched and sealed watertight.
5. Joints: Lapped, double seal with sealant.

D. Flashing Receivers: Fabricate from same materials as counterflashing.

E. Roof-Penetration Flashing: Fabricate from the following materials:

1. Galvanized Steel: 0.028 in (0.7 mm) thick.
2. Aluminum-Zinc Alloy-Coated Steel: 0.028 in (0.7 mm) thick.

## **2.11 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS**

A. Valley Flashing: Fabricate from the following materials, minimum thickness as indicated unless required otherwise to meet performance requirements.

1. Copper: 16 oz./sq. ft. (0.55 mm thick) .
2. Stainless Steel: 0.025 in (0.64 mm) thick.
3. Galvanized Steel: 0.028 in (0.7 mm) thick.
4. Aluminum-Zinc Alloy-Coated Steel: 0.028 in (0.7 mm) thick.
5. Joints: Lapped, double seal with sealant.

B. Drip Edges: Fabricate from the following materials, minimum thickness as indicated unless required otherwise to meet performance requirements.

1. Copper: 16 oz./sq. ft. (0.55 mm thick) .
2. Stainless Steel: 0.025 in (0.64 mm) thick.
3. Galvanized Steel: 0.028 in (0.7 mm) thick.
4. Aluminum-Zinc Alloy-Coated Steel: 0.028 in (0.7 mm) thick.
5. Joints: Lapped, double seal with sealant.

- C. Eave, Rake, Ridge, and Hip Flashing: Fabricate from the following materials, minimum thickness as indicated unless required otherwise to meet performance requirements.
  - 1. Copper: 16 oz./sq. ft. (0.55 mm thick) .
  - 2. Stainless Steel: 0.025 in (0.64 mm) thick.
  - 3. Galvanized Steel: 0.028 in (0.7 mm) thick.
  - 4. Aluminum-Zinc Alloy-Coated Steel: 0.028 in (0.7 mm) thick.
- D. Counterflashing: Shop fabricate with factory mitered and continuously welded corners, seal watertight. Fabricate from the following materials, minimum thickness as indicated unless required otherwise to meet performance requirements.
  - 1. Galvanized Steel: 0.028 in (0.7 mm) thick.
  - 2. Aluminum-Zinc Alloy-Coated Steel: 0.028 in (0.7 mm) thick.
  - 3. Joints: Lapped, double seal with sealant.
- E. Flashing Receivers: Fabricate from same materials as counterflashing.
- F. Roof-Penetration Flashing: Fabricate from the following materials:
  - 1. Galvanized Steel: 0.028 in (0.7 mm) thick.
  - 2. Aluminum-Zinc Alloy-Coated Steel: 0.028 in (0.7 mm) thick.

## **2.12 MISCELLANEOUS SHEET METAL FABRICATIONS**

- A. Equipment Support Flashing: Fabricate from the following materials:
  - 1. Galvanized Steel: 0.028 in (0.7 mm) thick.
- B. Overhead-Piping Safety Pans: Fabricate from the following materials:
  - 1. Stainless Steel: 0.025 in (0.64 mm) thick.
  - 2. Galvanized Steel: 0.040 in (1.0 mm) thick.
- C. Miscellaneous Flashings:
  - 1. Fabricate to cross section indicated with clips and accessories required for secure watertight installation. Meet recommendations of SMACNA for fabrication details and metal thicknesses.
  - 2. Not-Exposed to Public View: Fabricate from the following materials:
    - a. Galvanized Steel: 0.028 in (0.7 mm) thick.
  - 3. Concealed from View by other Construction: Fabricate from the following materials:
    - a. Stainless Steel: 0.025 in (0.64 mm) thick.

## **2.13 GENERAL FINISH REQUIREMENTS**

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

- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.
  - 1. Verify compliance with requirements for installation tolerances of substrates.
  - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
  - 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer's written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.
- B. Pitch Pockets (aka Pitch Pans) at Roof Penetrations: Pitch pockets (aka pitch pans) at roofing penetrations are not allowed and will be considered non-conforming work. Refer to the drawings for allowable roof penetration details.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

### **3.4 UNDERLAYMENT INSTALLATION**

- A. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 in (150 mm) staggered 24 in (600 mm) between courses. Overlap side edges not less than 3-1/2 in (87 mm). Roll laps and edges with roller. Cover underlayment within 14 days.
- B. If recommended by manufacturer, apply slip sheet, wrinkle free, before installing sheet metal flashing and trim.

### 3.5 SHEET METAL FLASHING AND TRIM INSTALLATION

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
  - 1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
    - a. Provide uniform, neat seams with minimum exposure of solder and sealant.
  - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
  - 3. Space cleats not more than 12 in (300 mm) apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
  - 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
  - 5. Torch cutting of sheet metal flashing and trim is not permitted.
  - 6. Do not use graphite pencils to mark metal surfaces.
- B. 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.
  - 3. Asphalt Roofing Cement: Bed flanges in thick coat of asphalt roofing cement where required by manufacturer of sheet metal flashing materials and fabrications for waterproof performance.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.
  - 1. When ambient temperature at time of installation is between 40 deg F and 70 deg F (4 deg C and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.
- D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.
  - 1. Concealed Sealant Joints: Use sealant-filled joints at lap joints unless otherwise

indicated. Embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).

2. Exposed Sealant Joints: Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 in (38 mm); however, reduce pre-tinning where pre-tinned surface would show in completed Work.
  1. Do not solder metallic-coated steel and aluminum sheet.
  2. Do not use torches for soldering.
  3. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
  4. Stainless-Steel Soldering: Tin edges of uncoated sheets, using solder for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
  5. Copper Soldering: Tin edges of uncoated sheets, using solder for copper.
- H. Rivets: Rivet joints in uncoated metals where necessary for strength.

### **3.6 ROOF-DRAINAGE SYSTEM INSTALLATION**

- A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.
- B. Hanging Gutters: Join sections with riveted and soldered joints or joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchor them in position. Provide end closures and seal watertight with sealant. Slope to downspouts.
  1. Fasten gutter spacers to front and back of gutter.
  2. Anchor and loosely lock back edge of gutter to continuous cleat..
  3. Anchor gutter with gutter brackets or straps spaced not more than 30 in (750 mm)] apart to roof deck, unless otherwise indicated, and loosely lock to front gutter bead.
  4. Install gutter with expansion joints at locations indicated, but not exceeding, 50 ft (15.24 m) apart. Install expansion-joint caps.
- C. Downspouts: Join sections with 1-1/2-in (38-mm) telescoping joints.
  1. Provide hangers with fasteners designed to hold downspouts securely to walls and 1 in (25 mm) from walls. Locate hangers at top and bottom and at approximately 60 in (1500 mm) o.c.
  2. Terminate downspouts as indicated on Drawings.
    - a. Provide elbows at base of downspout to direct water away from building.
    - b. Connect downspouts to underground drainage system.

- D. Splash Pans: Install where downspouts discharge on low-slope roofs. Set in asphalt roofing cement or elastomeric sealant compatible with the substrate.
- E. Parapet Scuppers: Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
  - 1. Exterior Wall: Anchor scupper closure trim flange to exterior wall and solder or seal with elastomeric sealant to scupper.
  - 2. Exterior Wall and Conductor Head: Loosely lock front edge of scupper with conductor head.
  - 3. Solder or seal with elastomeric sealant exterior wall scupper flanges into back of conductor head.
- F. Conductor Heads: Anchor securely to wall, with elevation of conductor head rim at minimum of 1 in (25 mm) below scupper or gutter discharge.
- G. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints minimum of 4 in (100 mm) in direction of water flow.

### **3.7 ROOF FLASHING INSTALLATION**

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate.
- C. Copings: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated.
  - 1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate.
  - 2. Anchor interior leg of coping as indicated on Drawings.
- D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 in (100 mm) over base flashing. Install stainless-steel draw band and tighten.
- E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 in (100 mm) over base flashing. Lap counterflashing joints minimum of 4 in (100 mm). Secure in waterproof manner by means of anchor and washer at 36 in (910 mm) centers unless otherwise indicated.
- F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with sealant and clamp flashing to pipes that penetrate roof.

### **3.8 REGLET AND COUNTERFLASHING INSTALLATION**

- A. General: Coordinate installation of reglets and counterflashings with installation of base flashings. Secure in a waterproof manner by means of anchor and washer at 36 in (900 mm) centers.
- B. Surface-Mounted Reglets: Install reglets to receive flashings where flashing without embedded reglets is indicated on Drawings. Install at height so that inserted counterflashings overlap 4 in (100 mm) over top edge of base flashings.
- C. Counterflashings: Insert counterflashings into reglets or other indicated receivers; ensure that counterflashings overlap 4 in (100 mm) over top edge of base flashings. Lap counterflashing joints a minimum of 4 in (100 mm) and bed with elastomeric sealant. Fit counterflashings tightly to base flashings.

### **3.9 MISCELLANEOUS FLASHING INSTALLATION**

- A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.
- B. Overhead-Piping Safety Pans: Suspend pans from structure above, independent of other overhead items such as equipment, piping, and conduit, unless otherwise indicated on Drawings. Pipe and install drain line to plumbing waste or drainage system.

### **3.10 ERECTION TOLERANCES**

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 in in 20 ft (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8 in (3mm) offset of adjoining faces and of alignment of matching profiles.

### **3.11 CLEANING AND PROTECTION**

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.
- E. Touchup Painting: Clean abraded or damaged areas of shop paint finish and paint exposed areas with the same material used for shop painting. Touchup finish is to match undamaged finish and extend into retained adjoining finish in a manner that will minimize evidence of touchup.

- F. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

### **3.12 FINISH SCHEDULE**

- A. Steel Sheet Finishes:
  - 1. Color and Gloss: Match color of adjacent building material, contingent upon approval by Architect.
- B. Aluminum Sheet Finishes:
  - 1. Color and Gloss: Match color of adjacent building material, contingent upon approval by Architect.

**END OF SECTION**

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Cherokee Nation  
Childers Architect  
2019-07-26

SHEET METAL FLASHING  
AND TRIM

07 6200 - 20

## **SECTION 0 77200**

### **ROOF ACCESSORIES**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Roof accessories and supplementary items necessary for installation of the following:
  - 1. Roof curbs.
  - 2. Equipment supports.
  - 3. Roof hatches.
  - 4. Heat and smoke vents.
  - 5. Rooftop pipe supports.
  - 6. Precast concrete splash blocks.
  - 7. Snow guards.
  - 8. Snow and ice melt systems.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work. Indicate dimensions, loadings, and special conditions.
- C. Samples for Initial Selection: Submit for each exposed product with factory-applied color finishes in each color and texture specified, prepared on Samples of size to adequately show color.
- D. Samples for Verification Purposes: Submit for each type of exposed finish required, prepared on Samples in manufacturer's standard sizes, and of same thickness and material indicated for the Work. If finishes involve normal color or shade variations, include sample sets showing the full range of variations expected.

##### **1.3 INFORMATIONAL SUBMITTALS**

- A. Field Quality Control Reports for Snow and Ice Melt System: Written report of testing and inspection required by "Field Quality Control".
- B. Snow and Ice Melt System Manufacturer's Project Acceptance Document: Certification by the manufacturer that its products and systems are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.
- C. Qualification Data:

1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.

D. Warranty: Sample of warranty.

1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

#### **1.4 CLOSEOUT SUBMITTALS**

A. Maintenance Data: To include in maintenance manuals.

#### **1.5 QUALITY ASSURANCE**

A. Manufacturer Qualifications: Manufacturer with not less than 10 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.

B. Installer Qualifications for Snow and Ice Melt System:

1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.

#### **1.6 PRE-INSTALLATION CONFERENCE**

A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

1. Participants:

- a. Architect.
- b. Contractor, including superintendent.
- c. Installer, including project manager and supervisor.
- d. If requested, Manufacturer's qualified technical representative.
- e. Installers of other construction interfaced with Work.

2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:

- a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
- b. Review Contract Document requirements.
- c. Review approved submittals.
- d. Review inspection and testing requirements.
- e. Review environmental conditions and procedures for coping with unfavorable conditions.
- f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.

3. Record discussions, including decisions and agreements, and prepare report.

## **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver roof accessories to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, and date of manufacture.
- B. Protect roof accessories from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- C. Handle, store, and install roof accessories in a manner to avoid permanent deflection of roof deck.

## **1.8 COORDINATION**

- A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.
- B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

## **1.9 WARRANTY**

- A. Manufacturer's Warranty for Roof Hatches and Smoke Vents: Furnish manufacturer's written material warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials required to repair or replace work which exhibits material defects caused by manufacture or design of product. "Defects" is defined to include but not limited to deterioration or failure to perform as required. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge to the Owner.
  1. Warranty Period: Manufacturer shall warrant the products to be free from material defects for a period of 5 years from date of Substantial Completion.
- B. Manufacturer's Warranty for Snow and Ice Melt System: Furnish manufacturer's written material warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials required to repair or replace work which exhibits material defects caused by manufacture or design of product. "Defects" is defined to include but not limited to deterioration or failure to perform as required.
  1. Warranty Period: Manufacturer shall warrant the products to be free from material defects for a period of 2 years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".

- B. Available Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those listed.
- C. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

## **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

## **2.3 PERFORMANCE REQUIREMENTS**

- A. General Performance: Installed roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.
- B. Standards: Comply with the following:
  1. SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.
  2. NRCA's "Roofing and Waterproofing Manual" details for installing units.

## **2.4 METAL MATERIALS**

- A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653 / A 653M, G90 (Z275) coating designation.
- B. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792 / A 792M, AZ50 (AZM150) coated.
- C. Steel Tube: ASTM A 500, round tube.
- D. Galvanized-Steel Tube: ASTM A 500, round tube, hot-dip galvanized according to ASTM A 123 / A 123M.
- E. Galvanized Steel Pipe: ASTM A 53/A 53M, hot-dip galvanized according to ASTM A 123 / A 123M.

## **2.5 MISCELLANEOUS MATERIALS**

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Treated Wood Nailers: As specified in Division 06 Section "Miscellaneous Rough Carpentry".
- C. Security Grilles: 3/4 in (19 mm) diameter, ASTM A 1011 / A 1011M steel bars spaced 6 in (150 mm) on center in one direction and 12 in (300 mm) on center in the other; factory finished as follows:

1. Surface Preparation: Remove mill scale and rust, if any, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning" or SSPC-SP 8, "Pickling".
  2. Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment.
  3. Shop Primer: Manufacturer's or fabricator's standard, fast-curing, lead- and chromate-free, universal primer; selected for resistance to normal atmospheric corrosion, for compatibility with substrate and field-applied finish paint system indicated, and for capability to provide a sound foundation for field-applied topcoats under prolonged exposure.
- D. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30 mils (0.762 mm) thickness per coat.
- E. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide non-removable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:
1. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153 / A 153M or ASTM F 2329.
- F. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.
- G. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.
- H. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.
- I. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.
- J. Underlayments:
1. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
  2. Polyethylene Sheet: 6 mils (0.15 mm) thick polyethylene sheet complying with ASTM D 4397.
  3. Slip Sheet: Building paper, 3 lb/100 sf (0.16 kg/sm) minimum, rosin sized.

## **2.6 ROOF CURBS**

- A. Insulated Roof Curbs: Internally reinforced roof-curb units capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings; with welded or mechanically fastened and sealed corner joints, and integrally formed deck-mounting flange at perimeter bottom.
1. Manufacturers:
    - a. Custom Solution Roof and Metal Products.
    - b. Pate Company.
    - c. Roof Products, Inc.

- d. Thybar Corporation.
- B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.
- C. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.079 in (2 mm) thick. Factory prime coating finish.
- D. Construction:
  - 1. Insulation: Manufacturer's standard.
  - 2. Liner: Same material as curb, of manufacturer's standard thickness and finish.
  - 3. Factory-installed treated wood nailer at top of curb, continuous around curb perimeter.
  - 4. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
  - 5. Fabricate curbs to minimum height of 12 in (300 mm) unless otherwise indicated.
  - 6. Top Surface: Level around perimeter with roof slope accommodated by sloping the deck-mounting flange.
  - 7. Sloping Roofs: Where roof slope exceeds 1:48, fabricate curb with perimeter curb height tapered to accommodate roof slope so that top surface of perimeter curb is level. Equip unit with water diverter or cricket on side that obstructs water flow.
  - 8. Security Grille: Provide where indicated.

## 2.7 EQUIPMENT SUPPORTS

- A. Insulated Equipment Supports: Internally reinforced metal equipment supports capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings; with welded or mechanically fastened and sealed corner joints, and integrally formed deck-mounting flange at perimeter bottom.
  - 1. Manufacturers:
    - a. Custom Solution Roof and Metal Products.
    - b. Pate Company.
    - c. Roof Products, Inc.
    - d. Thybar Corporation.
- B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.
- C. Material: Zinc-coated (galvanized) or Aluminum-zinc alloy-coated steel sheet, 0.079 in (2 mm) thick. Factory prime coating finish.
- D. Construction:
  - 1. Insulation: Manufacturer's standard.
  - 2. Liner: Same material as equipment support, of manufacturer's standard thickness and finish.
  - 3. Factory-installed continuous treated wood nailers 3-1/2 in (87 mm) wide at tops of equipment supports.
  - 4. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as equipment support.

5. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
6. Fabricate equipment supports to minimum height of 12 in (300 mm) unless otherwise indicated.
7. Sloping Roofs: Where roof slope exceeds 1:48, fabricate each support with height to accommodate roof slope so that tops of supports are level with each other. Equip supports with water diverters or crickets on sides that obstruct water flow.

## **2.8 HEAT AND SMOKE VENTS**

- A. Heat and Smoke Vents: Manufacturer's standard, with double-walled insulated curbs, welded or mechanically fastened and sealed corner joints, integral condensation gutter, and cap flashing. Fabricate with insulated double-walled lid and continuous weathertight perimeter lid gaskets, and equip with automatic self-lifting mechanisms and UL-listed fusible links rated at 165 deg F (74 deg C) and coordinated with fire-suppression and smoke-detection systems.
  1. Manufacturers:
    - a. Acudor Products, Inc.
    - b. Babcock-Davis.
    - c. Bilco Company.
    - d. Dur-Red Products.
    - e. J.L. Industries, Inc.
    - f. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.
    - g. Nystrom Building Products.
  2. Type and Size: As indicated on the Drawings.
  3. Loads: Minimum 40 lbf/sf (1.9 kPa) external live load and 30 lbf/sf (1.4 kPa) internal uplift load.
    - a. When release is actuated, lid shall open against 10 lbf/sf (0.5 kPa) snow or wind load and lock in position.
  4. Heat and Smoke Vent Standard: Provide units that have been tested and listed to comply with UL 793 and are FMG Approved.
  5. Curb, Framing, and Lid Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.079 in (2.01 mm) thick.
  6. Construction:
    - a. Insulation: Manufacturer's standard.
    - b. Hatch Lid: Opaque, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.
    - c. Exterior Curb Liner: Manufacturer's standard, of same material and finish as metal curb.
    - d. Fabricate curbs to minimum height of 12 in (300 mm), unless otherwise indicated.
    - e. Sloping Roofs: Where slope or roof deck exceeds 1:48, fabricate curb with perimeter curb height that is tapered to accommodate roof slope so that top surfaces of perimeter curb are level. Equip hatch with water diverter or cricket on side that obstructs water flow.
    - f. Security Grille: Provide where indicated.

7. Hardware: Manufacturer's standard, corrosion resistant or hot-dip galvanized; with hinges, hold-open devices, and independent manual-release devices for inside and outside operation of lids.

## **2.9 ROOFTOP PIPE SUPPORTS**

- A. Rooftop Supports for Piping, Conduit, Cable Tray or Equipment: Installation without requiring roof penetrations, flashing, or damage to the roofing material. Support bases and pipe rollers made of an engineered thermoplastic with appropriate additives for UV protection. All structural steel components hot-dipped galvanized. Height-adjustable supports must be used where necessary. The support shall have a continuous bottom surface to provide even load distribution and minimize point loading of the roof membrane. Support base to have radiused edge to enhance compatibility with roof membranes.
  1. Load Capacity: Up to 1,500 lbs (680 kg).
- B. The rooftop strut support shall provide a fixed-height mounting platform of 4 or 6 inches (100 or 150 mm) off of the roof and a usable strut length of up to 10 or 16 inches (250 or 400 mm).
- C. The adjustable-height strut support shall allow elevations changes of up to 16 inches (400 mm) off of the roof and a usable strut length of up to 10 or 16 inches (250 or 400 mm).
- D. The rooftop roller support shall provide roller capacity for up to nominal 6 inches (150 mm) steel pipe with a minimum 5-1/2 inches (138 mm) fixed height off of the roof.
- E. The adjustable-height roller support shall provide roller capacity for up to nominal 6 inches (150 mm) steel pipe and accommodate elevation changes of up to 16 inches (400 mm) off of the roof. The rollers shall be polymeric. The roller axle, fittings and other hardware shall be manufactured of hot-dipped galvanized steel.
- F. Basis of Design: ERICO International Corporation; ST Series, Strut-based Thermoplastic Supports.

## **2.10 PRECAST CONCRETE SPLASH BLOCKS**

- A. Prefabricated units of reinforced Portland cement concrete, aggregates, admixtures, and water; shaped to divert water away from building. Minimum size: 12 in (300 mm) by 24 in (600 mm) by 3 in (75 mm) high. Weight: 50 lbs (22.6 kg). Provide protection layer below splash block to protect roofing system.

## **2.11 SNOW GUARDS**

- A. Snow Guards, General: Prefabricated, noncorrosive units designed to be installed without penetrating roofing system; complete with predrilled holes, clamps, or hooks for anchoring. Snow guards materials and mounting method shall be fully compatible with adjacent roofing system to avoid any damage or penetrations which may compromise the integrity of the system.
- B. Surface-Mounted, Plastic, Stop-Type Snow Guards: Clear polycarbonate stops designed for attachment to panel surface of roofing system using construction adhesive, silicone or polyurethane sealant, or adhesive tape.

- C. Surface-Mounted, Metal, Stop-Type Snow Guards: Cast-aluminum stops designed for attachment to panel surface of roofing system using construction adhesive, silicone or polyurethane sealant, or adhesive tape.
- D. Seam-Mounted, Stop-Type Snow Guards: Cast-aluminum stops designed for attachment to vertical ribs of standing-seam sheet metal roofing with stainless-steel set screws.
- E. Seam-Mounted, Bar-Type Snow Guards: Rail- or fence-type assembly consisting of mill-finished aluminum or stainless-steel rods, bars, or pipe held in place by stainless-steel clamps attached to vertical ribs of standing-seam sheet metal roofing.
- F. Surface-Mounted, Copper, Stop-Type Snow Guards: Bronze-alloy stops designed for attachment to panel surface of copper roofing using solder.
- G. Manufacturers:
  - 1. Alpine SnowGuards, a division of Vermont Slate & Copper Services, Inc.
  - 2. Berger Building Products.
  - 3. Chemlink, Inc.
  - 4. LMCurbs
  - 5. Polar Blox.
  - 6. Precision Molding Co., Inc.
  - 7. Snoblox / Snojax Inc.
  - 8. Sno-Gem, Inc.
  - 9. TRA Mage Inc.
  - 10. Zaleski Snow-Guards & Roofing Specialties

## **2.12 GENERAL FINISH REQUIREMENTS**

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of accepted Samples and are assembled or installed to minimize contrast.

## **2.13 GALVANIZED STEEL SHEET FINISHES**

- A. Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.
  - 1. Galvanizing Repair Paint: High-zinc-dust-content paint for regalanizing welds in steel, complying with SSPC-Paint 20.
- B. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil (0.025 mm) for topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).
  - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

2. Color: As scheduled or as indicated in Design Selections.
  3. Baked-Enamel:
- C. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil (0.005 mm).

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
1. Respective manufacturer's written installation instructions.
  2. Accepted submittals.
  3. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in **Work**.

### **3.4 INSTALLATION OF ROOF ACCESSORIES**

- A. General: Install and securely anchor roof accessories directly to structural supporting deck or substrate (not on top of wood blocking) so they are capable of resisting indicated loads.
1. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
  2. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
  3. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous paint or by other permanent separation as recommended by manufacturer.

1. Underlayments: Where installing roof accessories directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene sheet.
  2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.
- C. Roof Curb Installation: Install each roof curb so top surface is level, unless otherwise indicated.
- D. Equipment Support Installation: Install equipment supports so top surfaces are level with each other.
- E. Roof-Hatch Installation:
1. Install roof hatch so top surface of hatch curb is level, unless otherwise indicated.
  2. Verify that roof hatch operates properly. Clean, lubricate, and adjust operating mechanism and hardware.
  3. Attach safety railing system to roof-hatch curb.
  4. Attach ladder-assist post according to manufacturer's written instructions.
- F. Heat and Smoke Vent Installation:
1. Install heat and smoke vent so top perimeter surfaces are level.
  2. Install and test heat and smoke vents and their components for proper operation according to NFPA 204.
- G. Operational Units: Test-operate units with operable components. Clean and lubricate joints and hardware. Adjust for proper operation.
- H. Rooftop Pipe Support Installation: Comply with MSS SP-58 and MSS SP-89. Install supports and attachments as required to properly support piping. Arrange for grouping of parallel runs of horizontal piping, and support together.
1. Provide complete and adequate support of all piping and conduit, whether or not all required devices are shown.
  2. The use of wood for supporting piping is NOT permitted.
  3. Provide supports spaced so deflection of piping does not exceed 1/240 of span.
  4. Isolation Pads: Consult manufacturer of existing or new roofing system as to the type of isolation pads required between the roof and support. Set isolation pads in adhesive if required by manufacturer's instructions. Place supports on isolation pads.
- I. Precast Concrete Splash Blocks: Install splash block at outlet locations of downspouts. Set splash block over protection layer to protect roofing system.
- J. Stop-Type Snow Guards: Attach snow guards to roofing system with adhesive or adhesive tape, as recommended by manufacturer. Do not use fasteners that will penetrate roofing system. Install snow guards in layout, spacing, and pattern indicated on the Drawings.
- K. Bar-Type Snow Guards: Attach bar supports to vertical ribs of metal roofing system with clamps or set screws. Do not use fasteners that will penetrate roofing system. Install snow guards in layout, spacing, and pattern indicated on the Drawings.
- L. Snow and Ice Melt Systems: Install in accordance with manufacturer's written installations at layout, spacing, pattern and locations indicated on the Drawings. Coordinate the complete

snow and ice melt system installation with the gutter, roofing, and flashing installations.

### **3.5 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.
  - 1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.

### **3.6 REPAIR AND CLEANING**

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780.
- B. Clean exposed surfaces according to manufacturer's written instructions.
- C. Clean off excess sealants.
- D. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- E. Touch up factory-primed surfaces with compatible primer ready for field painting according to Division 09 painting Sections.

**END OF SECTION**

## **SECTION 078116**

### **SPRAYED FIRE-RESISTIVE MATERIALS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Sprayed fire-resistive materials (SFRM) and supplementary items necessary for installation.

##### **1.2 DEFINITIONS**

- A. SFRM: Sprayed Fire-Resistive Materials.
- B. Concealed: Not visible; hidden by other construction.
- C. Exposed: Visible, not hidden by other construction.
- D. Direct Moisture: Exposed to wetness, surfaces normally soaked, saturated or regularly exposed to water and or moisture.

##### **1.3 ACTION SUBMITTALS**

- A. Fire-Rated Assembly Design Classification: Submit documentation issued by testing agency for each fire-rated assembly design selected.
- B. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- C. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.
  - 1. Source: Submit one of following:
    - a. Shop drawings specifically prepared by fire-resistive materials applicator with required information.
    - b. Structural steel fabricator's erection plans with required information hand-marked and color-coded.
  - 2. Required Information:
    - a. Show requirements for steel surface preparation.
    - b. Identify locations for each fire-rated assembly design selected.
    - c. Indicate minimum fire-resistive material thicknesses needed to achieve required fire-ratings for each structural member.

##### **1.4 INFORMATIONAL SUBMITTALS**

- A. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.
- B. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
- C. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
- D. Compatibility and Adhesion Test Reports: Submit indicating fire-resistive material components, including primers, have been tested for bond with steel substrates and between each other.
- E. Patching Plan: Submit written plan detailing materials and methods to be used for patching of fire-resistive materials damaged during construction.

## **1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Installer Qualifications:
  - 1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  - 2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project
- C. Test for bond according to ASTM E 736 and requirements in UL's "Fire Resistance Directory" for fire-resistive materials.
- D. Verify that manufacturer, through its own laboratory testing or field experience, has not found primers to be incompatible with fire-resistive materials.
- E. Fire-Test-Response Characteristics: Provide fire-resistive materials with fire-test-response characteristics indicated, as determined by testing identical products according to test method by testing agency indicated below, or listing of other testing agency acceptable to authorities having jurisdiction. Identify bags containing fire-resistive materials with appropriate markings of applicable testing and inspecting agency.
- F. Fire-Resistance Ratings: Tested according to UL 263/ASTM E 119/NFPA 251 under Category CHPX published in UL's "Fire Resistance Directory" for Spray-Applied Fire-Resistive Materials.
- G. Surface-Burning Characteristics: When tested according to ASTM E 84:
  - 1. Flame Spread: Less than 25.
  - 2. Smoke Developed: Less than 450.

## **1.6 PRE-INSTALLATION CONFERENCE**

A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

1. Participants:

- a. Architect.
- b. Contractor, including superintendent.
- c. Installer, including project manager and supervisor.
- d. If requested, Manufacturer's qualified technical representative.
- e. Installers of other construction interfaced with Work.

2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:

- a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
- b. Review Contract Document requirements.
- c. Review approved submittals.
- d. Review inspection and testing requirements.
- e. Review environmental conditions and procedures for coping with unfavorable conditions.
- f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.

3. Record discussions, including decisions and agreements, and prepare report.

## **1.7 PROJECT CONDITIONS**

A. Environmental Requirements: Comply with manufacturer's recommendations for temperature and ventilation requirements during and after application.

B. Work Sequence Requirements:

1. Metal Floor Deck: Apply fire-resistive materials after concrete topping has been completed.
2. Metal Roof Deck: Apply fire-resistive materials after concrete topping and roofing installation has been completed.
3. Personnel Traffic: Prohibit on floor and roof above during application and drying of fire-resistive materials.
4. Accessories: Apply fire-resistive materials after steel stud framing, clips, hangers, supports, sleeves, and other items are in place.
5. Suspended Components: Defer installing ducts, piping, and other items that would interfere with applying fire-resistive materials until after application.

C. Protection During Work: Provide temporary enclosure as required for following:

1. Confine spraying operations and protect environment.
2. Prevent deterioration of fire-resistive materials due to exposure to weather and to unfavorable ambient conditions for humidity, temperature, and ventilation.
3. Prevent unnecessary abrasion and other damage likely to occur during construction operations subsequent to application.

## **1.8 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **1.9 WARRANTY**

- A. Installer's Warranty: Furnish installer's written workmanship warranty signed by an authorized representative using installer's standard form agreeing to provide labor required to repair or replace work which exhibits workmanship defects. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

1. Coverage of warranty includes but is not limited to the following:
  - a. Defects or deterioration.
  - b. Cracking, flaking, or spalling.
  - c. Peeling or delaminating from substrates.
  - d. Failure to remain bonded.
  - e. Erosion in excess of specified requirements.
  - f. Faulty application.
2. Exclusions: Not covered are failures due, but not limited to, following:
  - a. Damage by occupants and Owner's maintenance personnel.
  - b. Exposure to environmental conditions other than those investigated and approved during fire-response testing.
  - c. Other causes not reasonably foreseeable under conditions of normal use.
3. Warranty Period: Installer shall warrant the installation to be free from workmanship Defects for a period of 2 years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
- B. Available Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those listed.

### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

### **2.3 PRIMARY MATERIALS**

- A. Fire-Rated Assembly Design: Selected from Product Category BXUV published in UL's "Fire Resistance Directory" for sprayed fire-resistive materials, or design of other testing agency acceptable to authorities having jurisdiction.

- B. Material Compatibility: Primer and sprayed fire-resistive materials shall be compatible with one another and with substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and laboratory analysis.
- C. Sprayed Fire-Resistive Material: Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design.
  - 1. Products mixed at Project site to form a slurry or mortar before conveyance and application.
  - 2. Absence of Asbestos: Containing no detectable asbestos as determined according to method specified in 40 CFR 763, Subpart E, Appendix E, and Section 1.
- D. Minimum Physical Properties: Following values unless higher value required by fire-rated assembly design selected.
- E. Minimum Dry Density: Average and individual densities, unless density indicated in fire-rated assembly design selected is greater according to ASTM E 605:
  - 1. Low-Density – Gypsum Binder: 15 pcf (240 k/cu m).
  - 2. Medium-Density - Gypsum Binder: 18 pcf (288 k/cu m).
  - 3. Medium-Density – Cement Binder: 22 pcf (352 k/cu m).
  - 4. High-Density – Cement Binder: 40 pcf (640 k/cu m).
- F. Thickness: Minimum average thickness as required by fire-rated assembly design selected according to ASTM E 605.
- G. Minimum Bond Strength: As follows according to ASTM E 736:
  - 1. Buildings Under 75 ft (22.5 m) in Height: 150 psf (7 kPa).
  - 2. Buildings Between 75 and 420 ft (126 m) in Height: 430 psf (21 kPa).
  - 3. Buildings Over 420 ft (126 m) in Height: 1,000 psf (48 kPa).
- H. Corrosion Resistance: No evidence of corrosion according to ASTM E 937.
- I. Deflection: No cracking, spalling, or delamination according to ASTM E 759.
- J. Effect of Impact on Bonding: No cracking, spalling, delamination, per ASTM E 760.
- K. Air Erosion: Maximum weight loss of 0.025 grams per square foot in 24 hours according to ASTM E 859.
- L. Combustion Characteristics: Passes ASTM E 136 or ASTM E 1354.
- M. Fungal Resistance: No observed growth on specimens according to ASTM G 21.
- N. Signal Color for Renovation Work: Incorporate dye in mix to distinguish new work from existing coated surfaces.

## **2.4 SPRAYED-FIRE RESISTIVE MATERIALS**

- A. SFRM-01 - Low-Density; minimum bond strength of 150 psf (7 kPa).
  - 1. Interior Locations: Unless a higher bond strength SFRM is scheduled below.

- a. Concealed conditions for buildings under 75 ft (22.5 m) in height.
  - 2. Manufacturers and Products:
    - a. Carbolite Co., Fireproofing Products Div.; Pyrolite 15 or Pyrolite 15 High-Yield.
    - b. Grace Construction Products; Monokote MK-6.
    - c. Isolatek International; Cafco 300 or Cafco 300 AC.
    - d. Southwest Fireproofing Products Co.; Type 5GP.
- B. SFRM-02:
- 1. Interior Locations: Unless a higher bond strength SFRM is scheduled below.
    - a. Concealed conditions for buildings between 75 ft (22.5 m) and 420 ft (126 m) in height.
    - b. Exposed conditions for buildings under 420 ft (126 m) in height.
  - 2. Low-Density; minimum bond strength of 430 psf (21 kPa):
    - a. Grace Construction Products; Monokote MK-10HB.
    - b. Isolatek International; Cafco 300HS.
  - 3. Medium Density; minimum bond strength of 430 psf (21 kPa):
    - a. Carbolite Co., Fireproofing Products Div.; Pyrolite 22.
    - b. Grace Construction Products; Monokote Z106G.
    - c. Isolatek International; Cafco 400 AC.
    - d. Southwest Vermiculite Co., Inc.; Type 5MD.
- C. SFRM-03:
- 1. Interior Locations: Unless a higher bond strength SFRM is scheduled below.
    - a. Concealed conditions for buildings over 420 ft (126 m) in height.
    - b. Exposed conditions for buildings over 420 ft (126 m) in height.
  - 2. Medium-Density; minimum bond strength of 1,000 psf (48 kPa):
    - a. Carbolite Co., Fireproofing Products Div.; Type 7GP.
    - b. Grace Construction Products; Monokote Z106/HY or MK-1000HB.
    - c. Isolatek International; Cafco 400 or Cafco 3000.
    - d. Southwest Fireproofing Products Co., Inc.; Type 7GP.
- D. SFRM-04 - Medium Density, Portland Cement Binder; minimum bond strength of 1,000 psf (48 kPa):
- 1. Interior Locations: Unless a higher bond strength SFRM is scheduled below.
    - a. Exposed columns.
    - b. Exposed structure in mechanical/electrical rooms and elevator shafts.
    - c. Exposed conditions subject to abrasion or humidity.
  - 2. Manufacturers and Products:

- a. Carboline Co., Fireproofing Products Div.; Pyrolcrete 239.
  - b. Grace Construction Products; Monokote Z106/HY.
  - c. Isolatek International; Cafco 400.
  - d. Southwest Fireproofing Products Co., Inc.; Type 7GP.
- E. SFRM-05 - High-Density, Portland Cement Binder; minimum bond strength of 10,000 psf (480 kPa).
  - 1. Interior or Exterior Locations:
    - a. Exterior conditions.
    - b. Exposed conditions subject to impact or direct moisture.
  - 2. Manufacturers and Products:
    - a. Carboline Co., Fireproofing Products Div.; Pyrocrete 40.
    - b. Grace Construction Products; Monokote Z146.
    - c. Isolatek International; Fendolite M-II.
    - d. Southwest Vermiculite Co., Inc.; 7HD.
- F. SFRM-R - Low-Density; minimum bond strength of 150 psf (7 kPa):
  - 1. Interior Locations:
    - a. Renovation work and previously coated surfaces for buildings under 75 ft (22.5 m) in height.
  - 2. Manufacturers and Products:
    - a. Carboline Co., Fireproofing Products Div.; Retrolite 15.
    - b. Grace Construction Products; Retro-Guard RG.
    - c. Isolatek International; Cafco 300 SB.

## **2.5 AUXILIARY MATERIALS**

- A. General: Provide auxiliary materials compatible with fire-resistive materials and substrates approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-rated assembly design selected.
- B. Bonding Adhesive: If required, product provided by fire-resistive materials manufacturer for enhancing bond between substrate and fire-resistive materials.
- C. Patching Material: Product provided by fire-resistive materials manufacturer for patching damaged work.
- D. Substrate Conditioner Coating: If required, product provided by fire-resistive materials manufacturer for coating substrate prior to application complying with one of following:
  - 1. Bond strength complies with requirements specified in UL's "Fire Resistance Directory" for coating materials based on series of bond tests according to ASTM E 736.
  - 2. Identical to those used in approved fire-rated assembly design.

- E. Reinforcements: One of following materials fabricated of weight, configuration, and finish required to comply with fire-rated assembly design selected and manufacturer's written recommendations; include clips, accessories, and other anchorage devices required to attach reinforcement to substrates scheduled to receive fire-resistive materials:
  - 1. Expanded metal lath.
  - 2. Steel pins.
  - 3. Glass fiber or polypropylene fabric mesh.
- F. Sealer: Provide where required, suitable for application over applied sprayed fire-resistive material; of type recommended in writing by fireproofing manufacturer for each fire-resistive design.
- G. Topcoat: Provide where required, suitable for application over applied sprayed fire-resistive material; of type recommended in writing by fireproofing manufacturer for each fire-resistive design.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

#### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

#### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
  - 1. Protection of Adjacent Work: Cover other work subject to damage from fallout or overspray of fire-resistive materials during application.
- B. Substrate Conditions: Coordinate substrate preparations with Division 05 Section "Structural Steel".

1. Clean substrates of substances that have potential of impairing bond of fire-resistive materials, including dirt, oil, grease, release agents, rolling compounds, loose mill scale, incompatible primers, paints, identification markings, and encapsulants as recommended by fire-resistive material manufacturer.
  2. Objects penetrating fire-resistive materials, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
  3. Substrates are not obstructed by ducts, piping, equipment, walls, and other suspended construction that will interfere with application of fire-resistive materials.
  4. If steel has been coated with paint or primer, manufacturer shall determine if paint or primer has to be removed, or if fire-resistive materials can be applied without removal. If additional materials are required, include at no additional cost to Owner.
- C. Substrate Repair for Exposed Applications: Remove surface imperfections that could affect uniformity of texture and thickness in finished surface of fire-resistive materials. Remove minor projections and fill voids that would telegraph through fire-resistive materials after application.

### **3.4 INSTALLATION**

- A. Application Procedures: Apply fire-resistive materials in thicknesses and densities required to achieve each fire-rated assembly design selected.
1. Comply with manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey and spray fire-resistive materials, as applicable to particular conditions of installation and as required to achieve fire-rated assembly design selected.
  2. Where required, coat substrates with bonding adhesive or substrate primers before applying fire-resistive materials.
  3. Spray fire-resistive materials to maximum extent possible, then complete coverage by trowel application or other placement method recommended in writing by manufacturer.
  4. Maintain profile of substrates.
    - a. Reinforcement: Do not maintain profile of substrates where fire-resistive rating requires covering with reinforcement.
  5. Fill voids between members, including voids formed by corrugated and fluted decks above beams and similar voids.
  6. Reinforcement: Install reinforcement to comply with fire-rated assembly design selected and fire-resistive materials manufacturer's written recommendations for conditions of exposure and intended use. Securely attach to substrate in position required for support and reinforcement of fire-resistive materials. Use anchorage devices of type recommended in writing by fire-resistive materials manufacturer. Attach accessories where indicated or required for secure attachment to substrate.
  7. Exposed Applications: Provide uniform finish that is equivalent to approved mock-up.
  8. Cure fire-resistive materials according to fire-resistive materials manufacturer requirements.
- B. Patching: Under following conditions, remove sprayed fire-resistive materials and re-apply same sprayed fire-resistive materials as used for original application, or apply patching material:
1. Portions damaged, abraded, or removed by subsequent building construction.
  2. Previously applied materials determined by testing and inspection agency to be noncompliant.

- C. Sealers or Topcoats: Apply where required and as recommended in writing by fireproofing manufacturer for each application and fire-resistive design.

### **3.5 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.
  - 1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.
- B. Testing and Inspection Services: Owner will engage a qualified independent testing and inspection agency to perform field tests and inspections and to prepare test reports.
- C. Perform the tests and inspections of completed Work in successive stages. Do not proceed with application of fireproofing for the next area until test results for previously completed applications of fireproofing show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.
  - 1. Agency Responsibilities:
    - a. Agency personnel performing tests and inspections shall have not less than 3 years of experience in conducting field testing procedures.
    - b. Perform following tests and inspections according to local building code; if no building code requirements perform tests according to AWCI Technical Manual 12-A.
    - c. Required Testing and Inspections:
      - 1) Substrate Condition: Inspect to determine if substrates are prepared properly and comply with specified requirements; determine if substrate temperature at time of application is acceptable.
      - 2) Site Conditions during Application: Determine if temperature, humidity and other weather conditions comply with specified requirements.
      - 3) Test and inspect as required by Chapter 17 of the applicable building code entitled "Sprayed Fire-Resistant Materials".
      - 4) Patching: Inspect to determine if damaged substrates are properly patched to comply with approved fire-rated assembly design and approved patching plan submittal.
    - d. Reports shall contain not less than the information required by AWCI Technical Manual 12-A.
    - e. Interpret tests and inspections and state in each report whether applications comply with or deviate from specified requirements including, but not limited to, manufacturers product data and approved fire-rated assembly design.
    - f. If applications are found not in compliance with specified requirements perform additional random testing to determine extent of noncompliance at Contractor's expense.
    - g. Perform testing and inspecting to determine compliance of replaced, or additional work necessary because of noncompliant areas, with specified requirements at Contractor's expense.

2. Contractor's Responsibilities:

- a. Proceed with application for next area only when test and inspection results for previously completed applications show compliance with specified requirements. Tested values must equal or exceed values required for each approved fire-rated assembly design.
- b. Remove and replace applications where test and inspection results indicate it does not comply with specified requirements.
- c. Apply additional fire-resistive materials where test and inspection results indicate application does not comply with specified requirements.
- d. Additional testing and inspecting will be performed to determine compliance of replaced or additional work with specified requirements at Contractor's expense.

D. Fireproofing will be considered defective if it does not pass tests and inspections.

1. Remove and replace fireproofing that does not pass tests and inspections, and retest at Contractor's expense.
2. Apply additional fireproofing, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest at Contractor's expense.

E. Prepare test and inspection reports.

**3.6 PROTECTION**

- A. Protection: Protect fire-resistive materials from abrasion and damage resulting from construction operations or other causes so fire protection will be without damage or deterioration at time of substantial completion.

**3.7 REPAIR**

- A. Coordination: Coordinate application of fire-resistive materials with other construction to minimize need to cut or remove fire protection. As installation of other construction proceeds, inspect fire-resistive materials and patch any damaged or removed areas. Repair or replace work that has not been successfully protected.

**END OF SECTION**



## **SECTION 07 8413**

### **PENETRATION FIRESTOPPING**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. This Section includes penetration firestopping systems for openings and penetrations through smoke and fire-resistance-rated assemblies, and supplementary items necessary to complete their installation.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work. Include firestopping design designation of testing and inspecting agency acceptable to authorities having jurisdiction that evidences compliance with requirements for each condition indicated.
  - 1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each firestopping system configuration for construction and penetrating items.
  - 2. Where Project conditions require modification of qualified testing and inspecting agency's tested system to suit a particular firestopping condition, an engineering judgment derived from similar qualified tested system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment documents must follow requirements set forth by the International Firestop Council.

##### **1.3 INFORMATIONAL SUBMITTALS**

- A. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.
- B. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
- C. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".
- D. Qualification Data:

1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.

#### **1.4 QUALITY ASSURANCE**

- A. Installer Qualifications: An experienced installer who has completed firestopping systems similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."
- C. Source Limitations: Obtain penetration firestopping systems, for each kind of penetration and construction condition required, from a single manufacturer.
- D. Fire-Test-Response Characteristics: Provide firestopping systems that comply with the following requirements and those specified in "Performance Requirements" Article:
  1. Firestopping tests are performed by a qualified testing and inspecting agency performing testing and follow-up inspection services for firestopping systems acceptable to authorities having jurisdiction.
  2. Penetration firestopping systems: Provide materials that are identical to those tested per ASTM E 814 or UL 1479. Provide rated firestopping system products that bear classification marking of qualified testing and inspecting agency.
  3. FM Global: Provide classification markings on penetration firestopping corresponding to designations listed by the following:
    - a. FM Global in its "Building Materials Approval Guide."

#### **1.5 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

#### **1.6 PROJECT CONDITIONS**

- A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.
- B. Environmental Limitations: Do not install firestopping systems when ambient or substrate temperatures are outside limits permitted by firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- C. Ventilate firestopping systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

#### **1.7 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate firestopping systems.
- C. Notify Owner's inspecting agency at least seven days in advance of firestopping system installations; confirm dates and times on days preceding each series of installations.
- D. Do not cover up firestopping system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.

## **PART 2 - PRODUCTS**

### **2.1 FIRESTOPPING, GENERAL**

- A. Acceptable Manufacturers: Manufacturer is "acceptable" if firestopping system has been tested and listed by UL or other testing and inspection agency acceptable to authorities having jurisdiction and manufacturer can evidence product compliance with requirements of the Contract Documents.
  - 1. FM Global: Manufacturer to provide firestopping products in compliance with FM Global requirements as indicated in "Quality Assurance" Article.
- B. Compatibility: Provide firestopping systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating firestopping systems, under conditions of service and application, as demonstrated by firestopping system manufacturer based on testing and field experience.
- C. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials and approved by the qualified testing and inspection agency for firestopping systems indicated.

### **2.2 PERFORMANCE REQUIREMENTS**

- A. General: Provide firestopping systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly penetrated.
- B. F-Rated Systems: Provide penetration firestopping systems with F-ratings determined per ASTM E 814 or UL 1479, equaling or exceeding fire-resistance rating of constructions penetrated.
- C. T-Rated Systems: For the following conditions, provide penetration firestopping systems with T-ratings, as well as F-ratings, determined per ASTM E 814 or UL 1479, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
  - 1. Penetrations located outside wall cavities.
  - 2. Penetrations located outside fire-resistive shaft enclosures.
  - 3. Penetrations located in construction containing fire-protection-rated openings.

- D. For penetration firestopping systems exposed to view, provide products with flame-spread ratings of less than 25 and smoke-developed ratings of less than 450, as determined per ASTM E 84.

## **2.3 PENETRATION FIRESTOP SYSTEMS**

- A. Description: Classified in Underwriters Laboratories (UL) Fire Resistance Directory, "Section XHEZ - Penetration Firestop Systems", and/or "Section XHHW - Fill Void or Cavity Materials" for specific project conditions.
- B. Application Considerations:
  - 1. Firestops exposed to view and/or are scheduled to receive finishes shall be paintable or capable of receiving finish materials.
  - 2. Firestops exposed to traffic, moisture, and physical damage shall be products that do not deteriorate when exposed to these conditions.
  - 3. Firestops for water piping penetrations, of any type, shall be moisture-resistant products.
  - 4. Firestops for floor penetrations with annular spaces exceeding 4 in (100 mm) or more in width and exposed to possible loading and traffic shall be products capable of supporting the floor loads involved either by installing floor plates or by other means.
  - 5. Firestops for penetrations involving insulated piping shall be products that do not require removal of insulation.
  - 6. Firestops for cable trays and future penetrations shall be reusable pillows or bags.
- C. Provide firestops within fire resistive walls and partitions containing flush mounted devices such as outlet boxes, electrical cabinets and mechanical cabinets mounted back to back and spaced less than 24 inches on center in accordance with UL Fire Resistance Directory "Wall Opening Protective Materials", Category CLIV.
- D. For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

1. Remove foreign materials from surfaces of openings, joints and penetrating items that could interfere with adhesion of firestopping.
  2. Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.
  3. Remove laitance and form release agents from concrete.
- B. Priming: Prime substrates where recommended by firestopping manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape as soon as it is possible to do so without disturbing firestopping's seal with substrates.

### **3.3 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
1. Respective manufacturer written installation instructions.
  2. Accepted submittals.
  3. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

### **3.4 INSTALLATION OF PENETRATION FIRESTOPS**

- A. Install forming/damming materials and other accessories of types required to support fill materials during their application and in the position needed to produce the cross-sectional shapes and depths required to achieve fire ratings of designated penetration firestop systems. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- B. Install fill materials for penetration firestop systems by proven techniques to produce the following results:
1. Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.
  2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
  3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### **3.5 IDENTIFICATION**

- A. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 in (150 mm) of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
  2. Contractor's name, address, and phone number.
  3. Tested System or Engineered Judgement Number.
  4. Date of installation.
  5. Manufacturer's name.
  6. **Installer's name.**

### **3.6 FIELD QUALITY CONTROL**

- A. Where required, inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174 "Standard Practice for On-Site Inspection of Installed Fire Stops" or other recognized standard.
- B. Testing Agency: The Owner may employ and pay a qualified independent testing agency to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense.
1. Inspections shall include the following verifications:
    - a. Verify that proper specified firestopping system products and materials are used.
    - b. Verify installer's credentials and certification.
    - c. Verify that each firestopping system is installed in accordance with product manufacturer's latest published requirements.
    - d. Verify that firestopping system materials and installation comply with appropriate rating authorities' requirements.
    - e. Verify that firestopping system is installed in specified and/or indicated locations in rated assemblies.
  2. Do not proceed to enclose firestopping system installations with other construction until reports of examinations are issued.
  3. Where deficiencies are found, repair or replace firestopping system materials and products to bring deficient installation into compliance with specified requirements.

### **3.7 CLEANING**

- A. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping system products and of products in which opening and joints occur.

- B. Protect firestopping system components during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to produce firestopping complying with specified requirements.

**END OF SECTION**

**17-13 OSU, College of Osteopathic Medicine at  
Cherokee Nation  
Childers Architect  
2019-07-26**

**PENETRATION  
FIREPROOFING**

## **SECTION 07 8446**

### **FIRE RESISTIVE JOINT FIRESTOPPING**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. This Section includes firestopping systems for joints at perimeter and through smoke and fire-resistance-rated assemblies, and supplementary items necessary to complete their installation.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Include firestopping design designation of testing and inspecting agency acceptable to authorities having jurisdiction that evidences compliance with requirements for each condition indicated. Distinguish between shop and field-assembled work.
  - 1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each firestopping system configuration for each type construction.
  - 2. Where Project conditions require modification of qualified testing and inspecting agency's tested system to suit a particular firestopping condition, an engineering judgment derived from similar qualified tested system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment documents must follow requirements set forth by the International Firestop Council.

##### **1.3 INFORMATIONAL SUBMITTALS**

- A. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.
- B. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
- C. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".
- D. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed firestopping systems similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Firestop System installation shall meet requirements of ASTM E 1966 and/or ANSI/UL 2079 tested and listed assemblies that provide fire-resistance ratings not less than that of the construction in which the joint occurs.
- C. Source Limitations: Obtain firestopping systems, for each kind of construction condition required, from a single manufacturer.
- D. Compatibility and Adhesion Testing: Manufacturer of fire stopping material shall be responsible for testing samples of materials that will contact or affect firestopping materials.
  - 1. Use manufacturer's standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of fill materials to joint substrates.
  - 2. Perform tests under environmental conditions replicating those that will exist during installation.
  - 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
  - 4. For materials failing tests, obtain fire-resistant joint sealants manufacturer's written instructions for corrective measures, including the use of specially formulated primers.
- E. Fire-Test-Response Characteristics: Provide firestopping systems that comply with the following requirements and those specified in "Performance Requirements" Article:
  - 1. Firestopping tests are performed by a qualified testing and inspecting agency performing testing and follow-up inspection services for firestopping systems acceptable to authorities having jurisdiction.
  - 2. Fire Resistive Joint System: Provide materials that are identical to those tested according to UL 2079 or ASTM E 1966. Products shall have a flame spread rating of less than 25.
    - a. Where UL-classified fire-resistant joint sealants are indicated, they refer to alphanumeric designations listed in UL's "Fire Resistance Directory" under product Category XHBN.
    - b. Safing Material: Provide materials that are identical to those tested according to ASTM E 84. Products shall have the following ratings:
      - 1) Flame Spread: Less than 15.
      - 2) Smoke Developed: 0.
    - c. System: Provide materials that are identical to those tested according to a modified ASTM E 119 test, where the furnace is modified to simulate a floor as it intersects with the wall. System shall have the following rating:
      - 1) Integrity Rating: 2 hours.
      - 2) F-Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.

- d. Where UL-classified perimeter fire-containment systems are indicated, they refer to alphanumeric designations listed in UL's "Fire Resistance Directory" under product Category XHBN or XHDG.

## **1.5 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

## **1.6 PROJECT CONDITIONS**

- A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.
- B. Environmental Limitations: Do not install firestopping systems when ambient or substrate temperatures are outside limits permitted by firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- C. Ventilate firestopping systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

## **1.7 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.
- B. Notify Owner's inspecting agency at least seven days in advance of firestopping system installations; confirm dates and times on days preceding each series of installations.
- C. Do not cover up firestopping system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.

# **PART 2 - PRODUCTS**

## **2.1 FIRESTOPPING, GENERAL**

- A. Acceptable Manufacturers: Manufacturer is "acceptable" if firestopping system has been tested and listed by UL or other testing and inspection agency acceptable to authorities having jurisdiction and manufacturer can evidence product compliance with requirements of the Contract Documents.
  - 1. FM Global: Manufacturer to provide firestopping products in compliance with FM Global requirements as indicated in "Quality Assurance" Article.
- B. Compatibility: Provide firestopping systems that are compatible with one another and the substrates forming openings, under conditions of service and application, as demonstrated by firestopping system manufacturer based on testing and field experience.
- C. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials. Use only components specified by firestopping system manufacturer and approved by the qualified testing and inspecting agency for firestopping systems indicated.

## **2.2 PERFORMANCE REQUIREMENTS**

- A. General: Provide firestopping systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly in which firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gasses.
- B. Fire-Resistant Joint Sealants: Provide systems for sealing linear joints in fire resistive rated assemblies that have ratings with movement capabilities equaling or exceeding the fire resistance rating of construction which joint occurs, as determined by UL 2079 or ASTM E 1966.
- C. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E 1966 or UL 2079.
  - 1. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.
- D. Joints in Smoke Barriers: Provide fire-resistive joint systems with ratings determined per UL 2079 based on testing at a positive pressure differential of 0.30-inch wg (74.7 Pa).
  - 1. L-Rating: Not exceeding 5.0 cfm/ft. (0.00775 cu. m/s x m) of joint at both ambient and elevated temperatures.
- E. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- F. Joints, required for control of movement, at intersection between Rated Wall Assemblies and Nonrated Horizontal Assemblies: Provide joint firestopping with ratings determined by ASTM E 2837.

## **2.3 TOP-OF-WALL JOINT FIRESTOPPING**

- A. Safing Insulation: Semi rigid board insulation produced by combining slag-wool fibers with thermosetting resin binders and complying with the following:
  - 1. ASTM C 612, Type 1A and 1B.
  - 2. Nominal density of 4 lb/cu. ft.
  - 3. ASTM E119 Fire rating indicated, but not less than 2 hours.
- B. Coating Material: Manufacturers standard fill material or spray applied product for sealing surface of safing insulation and adjacent construction against penetration of fire and smoke.
- C. Fire Resistive Sealants: Intumescent single-component, water based, high solids, elastomeric sealants. Nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant.

## **2.4 EDGE -OF-SLAB FIRESTOPPING**

- A. Safing Insulation: Semi rigid board insulation produced by combining slag-wool fibers with thermosetting resin binders and complying with the following:

1. ASTM C 612, Type 1A and 1B.
  2. Nominal density of 4 lb/cu. ft.
  3. ASTM E119 Fire rating indicated, but not less than 2 hours.
- B. Coating Material: Manufacturers standard fill material or spray applied product for sealing surface of safin insulation and adjacent construction against penetration of fire and smoke.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions

#### **3.2 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
1. Remove foreign materials from surfaces of joints that could interfere with adhesion of firestopping.
  2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.
  3. Remove laitance and form release agents from concrete.
- B. Priming: Prime substrates where recommended by firestopping manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape as soon as it is possible to do so without disturbing firestopping's seal with substrates.

#### **3.3 INSTALLATION - GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
1. Respective manufacturer written installation instructions.
  2. Accepted submittals.
  3. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

- C. Install forming/packing/backing materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
- D. Install fill materials for fire-resistant joint sealants by proven techniques to produce the following results:
  - 1. Fill voids and cavities formed by openings and forming/packing/backing materials as required to achieve fire-resistance ratings indicated.
  - 2. Apply fill materials so they contact and adhere to substrates formed by joints.
  - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### **3.4 INSTALLATION OF FIRE-RESISTANT JOINT SEALANTS**

- A. Comply with ASTM C 1193, and with the sealant manufacturer's installation instructions and drawings pertaining to products and applications indicated.
- B. Install joint fillers to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability and develop fire-resistance rating required.
- C. Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint width that optimum sealant movement capability. Install sealants at the same time joint fillers are installed.
- D. Tool nonsag sealants immediately after sealant application and prior to the time skinning or curing begin. Form smooth, uniform beads of configuration indicated or required to produce fire-resistance rating, as well as to eliminate air pockets, and to ensure contact and adhesion of sealants with sides of joint. Remove excess sealant from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

### **3.5 INSTALLATION OF FIRE SAFING PROTECTION**

- A. Top of Wall: Install safing insulation to fill gap between top of wall and floor slab above. Cut safing insulation 50 percent wider than gap to be filled to ensure compression fit.
- B. Edge of Slab: Install safing insulation to fill gap between edge of structural floor/roof slab and back of exterior wall on safing clips spaced as needed to support insulation but not further apart than 24 in (600 mm) o.c. unless not required by tested system. Cut safing insulation 50 percent wider than gap to be filled to ensure compression fit or install vertically as required by tested assembly.
- C. Install coating material or smoke seal compound to cover fill material and seal opening.

### **3.6 IDENTIFICATION**

- A. Identify fire-resistive joint systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within **6 in (150 mm)** of joint edge so labels will be visible to anyone seeking to remove or penetrate joint system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
1. The words "Warning - Fire-Resistive Joint System - Do Not Disturb. Notify Building Management of Any Damage."
  2. Contractor's name, address, and phone number.
  3. Tested System or Engineered Judgment Number.
  4. Date of installation.
  5. Manufacturer's name.
  6. Installer's name.

### **3.7 FIELD QUALITY CONTROL**

- A. Where required, inspection of fire resistive joint firestopping shall be performed in accordance with ASTM E 2393, "Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers" or other recognized standard.
- B. Testing Agency: The Owner may employ and pay a qualified independent testing agency to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense.
1. Inspections shall include the following verifications:
    - a. Verify that proper specified firestopping system products and materials are used.
    - b. Verify installer's credentials and certification.
    - c. Verify that each firestopping system is installed in accordance with product manufacturer's latest published requirements.
    - d. Verify that firestopping system materials and installation comply with appropriate rating authorities' requirements.
    - e. Verify that firestopping system is installed in specified and/or indicated locations in rated assemblies.
  2. Do not proceed to enclose firestopping system installations with other construction until reports of examinations are issued.
  3. Where deficiencies are found, repair or replace firestopping system materials and products to bring deficient installation into compliance with specified requirements.

### **3.8 CLEANING**

- A. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping system products and of products in which joints occur.
- B. Protect firestopping system components during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to produce firestopping complying with specified requirements.

**END OF SECTION**

## **SECTION 07 9100**

### **PREFORMED JOINT SEALS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Work required for this section includes joint fillers, seals and supplementary items necessary to complete their installation.
- B. Related Sections:
  - 1. Division 07 Section "Joint Sealants" for elastomeric sealants.
  - 2. Division 07 Section "Expansion Control" for joint cover assemblies.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.
- C. Samples for verification purposes in full-size units 4 in (100 mm) long of each type of joint seal indicated in sets for each finish, color, texture, and pattern specified, showing full range of variations expected in these characteristics.

##### **1.3 INFORMATIONAL SUBMITTALS**

- A. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.
- B. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.

##### **1.4 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

##### **1.5 PROJECT CONDITIONS**

- A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

## **1.6 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
- B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

### **2.3 MATERIALS**

- A. Foam Joint Filler: Preformed, polyethylene, closed cell, joint filler, of size and thickness required to fill joint.
  - 1. Strong, ultra-violet stable, resistant to oils, chemicals, ozone and weathering.
  - 2. Uni-cellular (closed cell) nature to prevent moisture absorption and heat transfer.
  - 3. Non-impregnated non-staining and non-bleeding.
  - 4. Compressible foam with superior recovery properties.
  - 5. Expand and compress with joint movement while keeping the joint sealed.
  - 6. Suitable as back-up material and completely compatible with various types of cold-applied sealants.
  - 7. Acceptable Manufacturers and Product:
    - a. ChemRex Inc., Sonneborn Building Products - "Sonoflex F"
    - b. Sealed Air Corporation, Cellu Products Division - "Cellu Joint"
    - c. Williams Products, Inc. - "Everlastic Expand-O-Foam 1380 Series"
- B. Preformed Compression Seals: Preformed, elastomeric extrusions having internal baffle system in sizes and profiles as recommended by the manufacturer.
  - 1. Standard Product: Watson Bowman Acme Corp. "Wabo" WE Series.
  - 2. Provide lubricant and adhesive for installation recommended by the manufacturer.
  - 3. Joint Size: As indicated.
  - 4. Color: As selected from manufacturers standard colors
  - 5. Acceptable Manufacturers:
    - a. D.S. Brown Company

- b. Conspec Systems, Inc.
  - c. Michael Rizza Company Inc.
  - d. MM Systems Corporation
  - e. Watson Bowman Acme Corp.
- C. Joint Tape Seals: Manufacturer's standard, solvent-free, butyl-based tape sealant.
  - 1. Solids content of 100 percent formulated to be nonstaining, paintable, and nonmigrating in contact with nonporous surfaces.
  - 2. With or without reinforcement thread to prevent stretch.
  - 3. Packaged on rolls with a release paper on one side.
  - 4. Acceptable Manufacturers and Product:
    - a. Norton Performance Plastics Corp., "Norseal V740"
    - b. Pecora Corp., "Extru-Seal Tape,"
    - c. Protective Treatments, Inc., "PTI 606,"
    - d. Tremco, Inc., "Tremco 440 Tape,"
- D. Preformed Foam Seals: Manufacturer's standard preformed, precompressed, impregnated open-cell foam sealant manufactured from high-density urethane foam impregnated with a nondrying, water repellent agent; factory-produced in precompressed sizes and in roll or stick form to fit joint widths indicated and to develop a watertight and airtight seal when compressed to the degree specified by manufacturer; and complying with the following requirements:
  - 1. Properties: Permanently elastic, mildew-resistant, nonmigratory, nonstaining, and compatible with joint substrates and other joint sealants.
  - 2. Impregnating Agent: Manufacturer's standard.
  - 3. Density: 8-10 pcf.
  - 4. Backing: Pressure-sensitive adhesive factory applied to one side with protective wrapping.
  - 5. Acceptable Manufacturer and Product:
    - a. Emseal Joint Systems, Ltd., "Emseal 25V"
    - b. Polytite Manufacturing Corp., "Polytite Standard"
    - c. Sealform, Ltd., "Wilseal 600"

## 2.4 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by seal manufacturer where required for adhesion to joint substrates indicated, as determined from preconstruction joint sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to joint seal manufacturers free of oily residues or other substances capable of staining or harming in any way joint substrates and adjacent nonporous surfaces, and formulated to promote optimum adhesion of seals with joint substrates.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
- B. Surface Cleaning of Joints: Clean out joints immediately before installing joint seal to comply with joint seal manufacturer's written instructions.
  - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint seal.
  - 2. Clean porous joint substrate surfaces to produce a clean, sound substrate capable of developing optimum bond with joint seal.
  - 3. Remove loose particles remaining from cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
  - 4. Remove laitance and form release agents from concrete.
  - 5. Clean nonporous surfaces with cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint seals.
- C. Joint Priming: Prime joint substrates where indicated or where recommended by joint seal manufacturer based on preconstruction joint seal substrate tests or prior experience. Apply primer to comply with joint seal manufacturer's recommendations. Confine primers to areas of joint seal bond; do not allow spillage or migration onto adjoining surfaces.

### **3.4 INSTALLATION OF JOINT SEALS**

- A. General: Comply with joint seal manufacturer's printed installation instructions applicable to products and applications indicated, unless more stringent requirements apply.
- B. Foam Joint Fillers: Install joint fillers to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of joint fillers.
2. Do not stretch, twist, puncture, or tear joint fillers.
3. Remove joint fillers that have become damaged prior to sealant application and replace with new material.

- C. Preformed Foam Seals: Install each length of seal immediately after removing protective wrapping, taking care not to pull or stretch material, and to comply with seal manufacturer's directions for installation methods, materials, and tools that produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of seal requires acceleration to produce seal, apply heat to seal in conformance with seal manufacturer's recommendations.
- D. Preformed Compression Seals: Install seals complying with manufacturer's instructions and with minimum number of end joints. For straight sections provide preformed seals in continual lengths. Vulcanize or heat-weld field splice joints in preformed seal material to provide watertight joints using procedures recommended by manufacturer. Apply adhesive, epoxy, or lubricant-adhesive approved by manufacturer to both interfaces before installing preformed seal. Seal transitions according to manufacturer's instructions.
- E. Joint Tape Seals: Install each length of seal immediately after removing protective wrapping, taking care not to pull or stretch material, and to comply with seal manufacturer's directions for installation methods, materials, and tools that produce seal continuity at ends, turns, and intersections of joints.

### 3.5 CLEANING

- A. Clean off excess primer and adhesive adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint seals and of products in which joints occur.

### 3.6 PROTECTION

- A. Protect joint seals during and after installation from contact with contaminating substances and from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint seals immediately so that installation of repaired areas are indistinguishable from original work.

**END OF SECTION**

17-13 OSU, College of Osteopathic Medicine at  
Cherokee Nation  
Childers Architect  
2019-07-26

PREFORMED JOINT SEALS

07 9100 - 6

## **SECTION 07 9200**

### **JOINT SEALANTS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Joint sealants, backing materials, and supplementary items necessary for installation.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Samples for Initial Selection: Where specified to provide sealant colors from manufacturer's standard and custom selections, provide manufacturer's color charts consisting of strips of cured sealants showing full range of colors available for each product exposed to view.
- C. Samples for Verification Purposes: Samples for each kind and color of joint sealants in 1/2 in (12 mm) wide joints formed between two 6 in (150 mm) long strips of material matching appearance of exposed surfaces adjacent to joint sealants.

##### **1.3 INFORMATIONAL SUBMITTALS**

- A. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
- B. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control" Article.
- C. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.
- D. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
- E. Warranties: Sample of warranties.
  - 1. Provide manufacturer's and installer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations, and exclusions.

## 1.4 QUALITY ASSURANCE

- A. Installer Qualifications:
1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
  3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.
- B. Mock-Ups: Before beginning Work of this Section, install joint sealants in mock-ups of the various assemblies specified in other Sections indicated to receive joint sealants specified in this Section. Mock-ups shall include each form of product and color required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.
- C. Pre-Construction Compatibility and Adhesion Testing: Provide samples of joint substrate materials that will contact or affect urethane and silicone joint sealants to respective joint sealant manufacturers for following testing:
1. General Requirements: Test materials forming joint substrates and joint sealant backings for compatibility and adhesion with joint sealants.
  2. Test Method: Manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
  3. Specimen Quantity: Provide not fewer than number of pieces required of each kind of material, including joint substrates, shims, joint sealant backings, secondary seals, and miscellaneous materials.
  4. Reports: Interpret test results and certify reports indicating requirements for primers and substrate preparation needed for adhesion or for corrective measures including use of specially formulated primers.
- D. -Construction Stain Testing: Submit samples of joint substrate materials that will contact or affect urethane and silicone joint sealants to respective joint sealant manufacturers for following testing:
1. General Requirements: Test materials forming joint substrates for resistance to staining caused by joint sealants.
  2. Test Method: ASTM C 1248.
  3. Specimen Quantity: Provide not fewer than number of pieces required by testing laboratory of each kind of material, including joint substrates, shims, joint sealant backings, secondary seals, and miscellaneous materials.
  4. Reports: Interpret test results and certify reports indicating if joint sealants stain substrate materials.

## 1.5 PRE-INSTALLATION CONFERENCE

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.
1. Participants:

a. Architect.

- b. Contractor, including superintendent.
  - c. Installer, including project manager and supervisor.
  - d. If requested, Manufacturer's qualified technical representative.
  - e. Installers of other construction interfaced with Work.
- 2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
  - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
  - b. Review Contract Document requirements.
  - c. Review approved submittals.
  - d. Review inspection and testing requirements.
  - e. Review environmental conditions and procedures for coping with unfavorable conditions.
  - f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
- 3. Record discussions, including decisions and agreements, and prepare report.

## **1.6 PROJECT CONDITIONS**

- A. Ambient Conditions: Install joint sealants within range of ambient and substrate temperatures and moisture conditions as recommended by manufacturer. Protect substrates from environmental conditions that affect performance.
  - 1. Do not apply to a damp or wet substrate or during high humidity conditions including snow, rain, fog, or mist.
- B. Weather Conditions Limitation: Proceed with Work only when existing and forecasted weather conditions will permit installation according to manufacturer's instructions and warranty requirements.

## **1.7 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **1.8 WARRANTY**

- A. Manufacturer's Warranty for Urethane Sealants: Furnish manufacturer's written material warranty for a period of 5 years from date of Substantial Completion signed by an authorized representative using manufacturer's standard form agreeing to furnish materials required to repair or replace work which exhibits material defects caused by manufacture or design of product. "Defects" is defined to include but not limited to deterioration or failure to perform as required.
- B. Manufacturer's Warranty for Silicone Sealants: Furnish manufacturer's written material for a period of 20 years from date of Substantial Completion signed by an authorized representative using manufacturer's standard form agreeing to furnish materials required to repair or replace work which exhibits material defects caused by manufacture or design of product. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

- C. Installer's Warranty: Furnish installer's written warranty for a period of 2 years from date of Substantial Completion signed by an authorized representative using installer's standard form agreeing to provide labor required to repair or replace work which exhibits workmanship defects. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to Conditions of the Contract and Division 01 Section "Substitution Procedures".

### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.
- B. Compatibility: Joint sealants, backings, and other related materials shall be compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint sealant manufacturer based on testing and field experience.
- C. Volatile Organic Compounds (VOC) Content of Interior Sealants: Sealants and primers for use inside weatherproofing system shall comply with following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):
  - 1. Elastomeric Sealants: 250 g/L.
  - 2. Primers for Non-Porous Substrates: 250 g/L.
  - 3. Primers for Porous Substrates: 775 g/L.
- D. Suitability for Contact with Food: Comply with authorities having jurisdiction for joints in repeated contact with food.
- E. Sealant Color: As scheduled or as indicated in Design Selections.

### **2.3 EXTERIOR ELASTOMERIC SEALANTS**

- A. Exterior Pourable Urethane Sealant:
  - 1. Product Quality Standard: ASTM C 920, Type M, Grade P, Class 25, Use T.
  - 2. Description: Multi-component, pourable, moisture curing, polyurethane sealant; rated for incline when used on sloped surfaces.
  - 3. Joint Movement Capability: Plus 25 percent, minus 25 percent.
  - 4. Primers: Product provided by sealant manufacturer if required by conditions.
  - 5. Manufacturers and Products:
    - a. BASF; MasterSeal SL 2 (Formerly Sonolastic SL 2).
    - b. Pecora Corp.; Urexpan NR-200.
    - c. Sika Corp., Construction Products Div.; Sikaflex 2c SL.

- d. Tremco Commercial Sealants & Waterproofing; THC-900/THC-901 or Vulkem 445SSL.

B. Exterior Non-sag Silicone Sealant:

1. Product Quality Standard: ASTM C 920, Type S, Grade NS, Class 50 or 100/50.
2. Description: Single component, non-sag, neutral cure, non-staining as determined by pre-construction stain testing, and non-bleeding, silicone sealant.
3. Joint Movement Capability:
  - a. Class 50: Plus 50 percent, minus 50 percent.
  - b. Class 100/50: Plus 100 percent, minus 50 percent.
4. Primers: Product provided by sealant manufacturer if required by conditions.
5. Manufacturers and Products:
  - a. Class 50:
    - 1) Dow Corning; 795 Silicone Building Sealant.
    - 2) Momentive Performance Materials, GE Silicones; Silpruf SCS2000.
    - 3) Pecora Corp.; 864NST.
    - 4) Sika Corp., Construction Products Div.; Sikasil WS-295.
    - 5) Tremco Commercial Sealants & Waterproofing; Spectrem 3.
  - b. Class 100/50:
    - 1) Dow Corning; 790 Silicone Building Sealant.
    - 2) Momentive Performance Materials, GE Silicones; Silpruf LM SCS2700.
    - 3) Pecora Corp.; 890NST.
    - 4) Sika Corp., Construction Products Div.; Sikasil WS-290.
    - 5) Tremco Commercial Sealants & Waterproofing; Spectrem 1.

## 2.4 INTERIOR ELASTOMERIC SEALANTS

A. Interior Non-sag Silicone Sealant:

1. Product Quality Standard: ASTM C 920, Type S, Grade NS, Class 25.
2. Description: Single component, non-sag, moisture curing, silicone sealant specially formulated with fungicide for use in sanitary non-porous applications.
3. Manufacturers and Products:
  - a. Dow Corning; 786 Silicone Sealant.
  - b. Momentive Performance Materials, GE Silicones; Sanitary SCS1700.
  - c. Pecora Corp.; 898.
  - d. Sika Corp., Construction Products Div.; Sikasil GP
  - e. Tremco Commercial Sealants & Waterproofing; Tremsil 200.

B. Interior Non-sag Urethane Sealant:

1. Product Quality Standard: ASTM C 920, Type S, Grade NS, Class 25 or 35.
2. Description: Single component, non-sag, moisture curing, non-staining as determined by pre-construction stain testing if exposed, polyurethane sealant.

3. Joint Movement Capability: Plus 25 percent, minus 25 percent, or plus 35 percent, minus 35 percent.
4. Primers: Product provided by sealant manufacturer if required by conditions.
5. Manufacturers and Products:
  - a. BASF; MasterSeal NP 1 (Formerly Sonolastic NP 1).
  - b. Pecora Corp.; Dynatrol I-XL.
  - c. Sika Corp., Construction Products Div.; Sikaflex 1a or Sikaflex Textured Sealant.
  - d. Tremco Commercial Sealants & Waterproofing; Dymonic or Vulkem 116.

C. Interior Non-sag Acrylic Latex Sealant:

1. Product Quality Standard: ASTM C 834, Type and Grade as required by conditions.
2. Description: Single component, non-sag, moisture curing, general purpose, paintable, siliconized acrylic latex sealant.
3. Joint Movement Capability: Plus 7.5 percent, minus 7.5 percent
4. Manufacturers and Products:
  - a. Pecora Corp.; AC 20+.
  - b. Tremco Commercial Sealants & Waterproofing; Tremflex 834.

D. Sprayed Foam Insulating Gap Filler:

1. Description: Low pressure, one-component, expanding, open-cell latex-based insulating foam gap filler; applied with professional hand-held dispensing gun; CFC and HCFC free.
2. Performance Requirements: Class 1 Fire-Retardant per ASTM E 84.
3. Manufacturers and Products:
  - a. Convenience Products; Touch N' Foam, Easy Fill Latex Foam Sealant.
  - b. DAP Products, Inc.; DAPtex Plus.

E. Acoustical Sealants: As specified in Division 09 Section "Gypsum Board Assemblies".

F. Fire Resistive Sealants: As specified in Division 07 Section "Fire Resistive Joint Firestopping".

## 2.5 HIGH TEMPERATURE SILICONE SEALANT

A. Exterior/Interior High-Temperature Silicone Sealant:

1. One-component non-slumping silicone sealant for sealing and bonding applications exposed to temperatures as high as 600 deg F (315 deg C).
2. Manufacturer and Product: Dow Corning; 736 Heat Resistant Sealant.

## 2.6 JOINT SEALANT BACKING

A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

1. Use open cell (Type O) sealant backing rod at interior line of sealant for double sealed condition unless otherwise recommended by sealant manufacturer.

B. Cylindrical Sealant Backings:

1. Product Quality Standard: ASTM C 1330, Type C, Type O, or Type B; as approved in writing by joint-sealant manufacturer for joint application indicated.
2. Description: Extruded polyethylene, polyurethane, or polyolefin in either closed cell structure (Type C), open cell structure (Type O), or bicellular structure with surface skin (Type B) as defined by ASTM Terminology C 717.
3. Size: Diameter approximately 25 percent larger than joint width, unless otherwise directed by manufacturer.
4. Manufacturers and Products:
  - a. Type C:
    - 1) BASF; MasterSeal 920 (Formerly Sonneborn, Closed-Cell Backer Rod).
    - 2) Nomaco Inc.; Green Rod or HBR.
  - b. Type O:
    - 1) Backer Rod Mfg. Inc.; Denver Foam.
    - 2) Nomaco Inc.; Foam-Pak II.
  - c. Type B:
    - 1) BASF; MasterSeal 921 (Formerly Sonneborn, Soft Backer Rod).
    - 2) Nomaco Inc.; Dual-Rod or Sof-Rod.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials, or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

## **2.7 ACCESSORIES**

- A. Cleaners for Non-porous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent non-porous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- B. Masking Tape: Non-staining, non-absorbent material compatible with joint sealants and surfaces adjacent to joints.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrate surfaces to receive products and systems and associated Work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting Work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
1. Respective manufacturer's written installation instructions.
  2. Accepted submittals.
  3. Contract Documents.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
- B. Cleaning of Joints: Clean out joints immediately before installing joint backings and sealants to comply with joint sealant manufacturer's written instructions and following requirements:
1. Remove foreign material that could interfere with adhesion of joint sealant, including, but not limited to, dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
  2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air.
  3. Remove laitance and form-release agents from concrete.
  4. Clean non-porous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
  5. Substrate material allowed by sealant's ASTM C 920 Use Classification.
- C. Joint Priming: Prime joint substrates where recommended by joint sealant manufacturer, or as indicated by prior experience, or as required by pre-construction compatibility and adhesion testing. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.
- D. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

### **3.4 INSTALLATION**

- A. Joint Sealant Backings: Install type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
1. Do not leave gaps between ends of sealant backings.
  2. Do not stretch, twist, puncture, or tear backings.

3. Remove absorbent sealant backings that have become wet or damaged before sealant application and replace with dry materials.
  4. Install bond-breaker tape behind sealants where backings are not used between sealants and backs of joints.
- B. Joint Sealants: Install at same time as backings using proven techniques that comply with following:
1. Place sealants so they directly contact and fully wet joint substrates.
  2. Completely fill recesses in each joint configuration.
  3. Produce uniform, cross sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
  4. Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs 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 sealant from surfaces adjacent to joints.
    - b. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
    - c. Use masking tape to protect surfaces adjacent to recessed tooled joints.
  5. Install joint sealants in accordance with ASTM C 1193 as applicable to materials, applications, conditions indicated, and with the following profile configurations:
    - a. Fillet: Figure 5.
    - b. Bridge: Figure 6.
    - c. Butt: Figure 8A (concave tooling), generally hour-glass shape with 2:1 width-to-depth ratio.
- C. Sprayed Foam Insulating Gap Filler: Apply sprayed foam insulating gap filler within exterior wall assemblies using professional hand-held dispensing gun in accordance with manufacturer's written instructions.
1. Prior to installation of wall finish systems, apply sprayed foam insulating gap filler to gaps, cracks, cavities, openings, and voids in exterior wall back-up, including annular space around piping, ducts, conduits, wiring, and electrical outlets to seal off potential air drafts.
  2. After sprayed foam sealant is applied, make flush with face of adjacent wall by using method recommended by manufacturer.

### **3.5 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.
1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.

B. Field Adhesion Testing: Before installation, field test urethane and silicone sealant adhesion to joint substrates as follows:

1. General Requirements:

- a. Locate test joints where indicated or, if not indicated, as directed by Architect.
- b. Conduct field tests for each kind of urethane and silicone sealants and joint substrates indicated.
- c. Notify Architect 7 days in advance of dates and times when test joints will be erected.

2. Test Frequency: Perform 1 test for each 1000 ft (300 m) of joint length thereafter or 1 test for each floor at each elevation.

3. Test Methods: Joint sealant manufacturer's technical representative shall conduct following tests:

a. When Joint Substrates are Identical: Test joint sealants according to ASTM C 1193, Method A (field-applied sealant joint hand pull tab) described below:

- 1) Conduct one test and one additional test for each 1000 ft (300 m) of kind of joint sealant material and substrate conditions.
- 2) Install 24 in (600 mm) long test specimens using same materials, methods for joint preparation, and joint sealant installation required for Work. Allow sealants to cure fully before testing.
- 3) Make horizontal knife cut across width of sealant joint from one substrate to other substrate.
- 4) Make 2 vertical cuts at both sides of substrates, downward starting at horizontal cut, approximately 3 in (75 mm) long.
- 5) Grasp 3 in (75 mm) long piece of sealant tab firmly 1 in (25 mm) from its bonded edge and pull at not less than 90 degree angle.
- 6) Substrate adhesion is acceptable if sealant tears cohesively within itself or elongates to a manufacturer determined extension value from 1 in (25 mm) gauge length before releasing from substrate adhesively.

b. When Joint Substrates are Different: Test joint sealants according to ASTM C 1193, Method C (field-applied sealant joint hand pull flap) described below:

- 1) Conduct one test and one additional test for each 1000 ft (300 m) of kind of joint sealant material and substrate conditions.
- 2) Install 24 in (600 mm) long test specimens using same materials, methods for joint preparation, and joint sealant installation required for Work. Allow sealants to cure fully before testing.
- 3) Make first horizontal knife cut across width of sealant joint from one substrate to other substrate.
- 4) Make one vertical cut along one side of substrate, downward starting at horizontal cut, approximately 3 in (75 mm) long.
- 5) Make second horizontal knife cut across width of sealant joint from one substrate to other substrate at opposite end of 3 in (75 mm) long first cut.
- 6) Grasp 3 in (75 mm) long piece of sealant flap firmly and pull at not less than 90 degree angle.

- 7) Substrate adhesion is acceptable if sealant tears cohesively within itself or elongates to a manufacturer determined extension value from 1 in (25 mm) gauge length before releasing from substrate adhesively.
4. Reports: Report which sealants and joint preparation methods resulted in optimum adhesion to joint substrates or whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each specimen. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
5. Evaluation of Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of non-compliance with requirements, will be considered satisfactory. Sealants failing to adhere to joint substrates during testing are not acceptable.

### **3.6 CLEANING**

- A. In-Progress Cleaning: Remove excess sealant or sealant smears adjacent to joints as Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

### **3.7 PROTECTION**

- A. General Requirements: Protect during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original Work.

### **3.8 JOINT SEALANT SCHEDULE**

- A. Exterior Elastomeric Sealant Applications:
  1. Exterior Pourable Urethane Sealant:
    - a. Moving joints in exterior concrete walks and drives.
  2. Exterior Non-sag Silicone Sealant:
    - a. Moving joints on exterior side of exterior walls.
    - b. Gaps between building materials and components created by items penetrating the primary drainage surface of the exterior building envelope.
    - c. Joints between dissimilar materials on exterior side of exterior walls.
- B. Interior Elastomeric Sealant Applications:
  1. Interior Non-sag Silicone Sealant:
    - a. Non-moving joints in moist or damp areas which are susceptible to mildew.
    - b. Non-moving joints in toilet rooms.
    - c. Non-moving joints in kitchens.
    - d. Non-moving joints in repeated contact with food.
  2. Interior Non-sag Urethane Sealant:

- a. Building joints on interior side of exterior walls where joint movement is anticipated.
- 3. Interior Non-sag Acrylic Latex Sealant:
  - a. Non-moving joints where another type of sealant is not otherwise specified or scheduled.
  - b. Minimal moving joints due to temperature change.
- C. Sprayed Foam Insulating Gap Filler Applications:
  - 1. Exterior non-moving gaps around windows, glazed aluminum walls, doors, and penetrations beneath weather-resistant coverings.
  - 2. Interior non-moving gaps around windows, glazed aluminum walls, doors, and penetrations.
- D. Exterior/Interior High-Temperature Silicone Sealant:
  - 1. High-temperature exterior or interior locations.

### **3.9 COLOR SCHEDULE**

- A. Sealant Colors:
  - 1. Exterior Pourable Urethane Sealant:
    - a. Color Selection: As selected from Manufacturer's Standard Colors.
  - 2. Exterior Non-Sag Silicone Sealant:
    - a. Color Selection: As selected from Manufacturer's Standard Colors.
  - 3. Exterior Non-Sag Urethane Sealant for Precast Concrete Seating Bowl:
    - a. Color Selection: As selected from Manufacturer's Standard Colors.
  - 4. Interior Non-Sag Silicone Sealant:
    - a. Color Selection: As selected from Manufacturer's Standard Colors.
  - 5. Interior Non-Sag Urethane Sealant:
    - a. Color Selection: As selected from Manufacturer's Standard Colors.
  - 6. Interior Non-Sag Acrylic Latex Sealant:
    - a. Color Selection: As selected from Manufacturer's Standard Colors.

**END OF SECTION**

## **SECTION 08 1113**

### **HOLLOW METAL DOORS AND FRAMES**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Custom hollow metal doors and frames and supplementary items necessary for installation.

##### **1.2 DEFINITIONS**

- A. Custom Hollow Metal Work: Hollow metal work fabricated according to ANSI/NAAMM-HMMA 861.
- B. Exterior: Areas exposed to the elements and areas located in unconditioned spaces.
- C. Interior: Areas located in conditioned spaces.

##### **1.3 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.
- C. Samples for Verification Purposes: Submit 12 in by 12 in (300 mm by 300 mm) samples to demonstrate compliance with requirements for quality of materials and construction:
  - 1. Doors: Show vertical-edge, top, and bottom construction; core construction; and hinge and other applied hardware reinforcement. Include separate section showing glazing if applicable.
  - 2. Frames: Show profile, head-to-jamb corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow metal panels and glazing if applicable.
- D. Door and Frame Schedule: Schedule prepared by or under supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.

##### **1.4 INFORMATIONAL SUBMITTALS**

- A. Oversize Construction Certification: Documentation for assemblies required to be fire rated and exceeding limitations of labeled assemblies.
- B. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.

C. Qualification Data:

1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.

**1.5 QUALITY ASSURANCE**

A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.

B. Installer Qualifications:

1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.

**1.6 PRE-INSTALLATION CONFERENCE**

A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

1. Participants:

- a. Architect.
- b. Contractor, including superintendent.
- c. Installer, including project manager and supervisor.
- d. If requested, Manufacturer's qualified technical representative.
- e. Installers of other construction interfaced with Work.

2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:

- a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
- b. Review Contract Document requirements.
- c. Review approved submittals.
- d. Review inspection and testing requirements.
- e. Review environmental conditions and procedures for coping with unfavorable conditions.
- f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.

3. Record discussions, including decisions and agreements, and prepare report.

**1.7 DELIVERY, STORAGE, AND HANDLING**

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.

- B. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4 in (100 mm) high wood blocking. Do not store in a manner that traps excess humidity.
  - 1. Provide minimum 1/4 in (6 mm) space between each stacked door to permit air circulation.

## **1.8 PROJECT CONDITIONS**

- A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

## **1.9 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.
- B. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

# **PART 2 - PRODUCTS**

## **2.1 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

## **2.2 PERFORMANCE REQUIREMENTS**

- A. General Performance: Engineer products and systems to withstand loads within limits of allowable working stresses of the materials involved under conditions indicated and without permanent deformation or failure of materials.
- B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
  - 1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
- C. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9. Label each individual glazed lite.
- D. Smoke-Control Door Assemblies: Assemblies complying with UL 1784.
- E. Exterior Door Air Infiltration: Maximum air leakage of 1.0 cfm/sf (5.08 L/s per sq m) when tested according to ASTM E 283 at a minimum static-air-pressure difference of 1.57 lbf/sf (75 Pa) .

- F. Windborne-Debris-Impact-Resistance Performance: Comply with impact resistance testing requirements for Wind Zone.

## **2.3 COMPONENT MATERIALS**

- A. Cold-Rolled Steel Sheet: ASTM A 1008 / A 1008M, Designation CS (Commercial Steel), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011 / A 1011M, Designation CS (Commercial Steel), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653 / A 653M, Designation CS (Commercial Steel), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating. Thickness indicated is for uncoated steel.
- D. Frame Anchors: ASTM A 591 / A 591M, Commercial Steel (CS), 40Z (12G) coating designation; mill phosphatized.
  - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008 / A 1008M or ASTM A 1011 / A 1011M, hot-dip galvanized according to ASTM A 153 / A 153M, Class B.
- E. Inserts, Bolts, and Fasteners: Device type and size required, hot-dip galvanized according to ASTM A 153 / A 153M, Class B.
- F. Fasteners into Concrete:
  - 1. Powder-Actuated Fasteners: Suitable for application indicated, ANSI A 10.3; low velocity, powder-actuated fasteners; drive pins and clip angles fabricated from corrosion-resistant materials, with clips or other devices for attaching frames into concrete substrate.
  - 2. Available Manufacturers:
    - a. Construction Materials, Inc.
    - b. Heckman Building Products, Inc.
  - 3. Post-Tensioned Concrete: For post-tensioned concrete, fasteners shall not exceed 1 in (25 mm) embedment. Obtain Structural Engineer's written approval for all proposed fasteners in post-tensioned concrete prior to installation.
- G. Mineral-Fiber Insulation for Installations in Sound-Rated Partitions: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6 to 12 lb/cu ft (96 to 192 kg/cu m) density; with following characteristics:
  - 1. Flame-Spread Index: 25 maximum.
  - 2. Smoke Development Index: 50 maximum.
  - 3. Combustion Characteristics: Passing ASTM E 136.
- H. Glazing: Comply with Division 08 Section "Glazing".
- I. Primer: Fast-curing, corrosion-inhibiting, lead and chromate free, universal primer complying with ANSI A224.1 acceptance criteria; compatible with substrate and field-applied finish paint system specified in Division 09 Section "Painting".

- J. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing minimum of 94 percent zinc dust by weight.

## **2.4 FABRICATION, GENERAL**

- A. Fabrication Quality Standard: ANSI/NAAMM-HMMA 861.
- B. General Requirements: Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit, and assemble units in manufacturer's plant.
- C. Accessories: Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.
- D. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to templates furnished as specified in Division 08 Section "Door Hardware".
  - 1. Locate hardware according to ANSI/NAAMM-HMMA 861.
  - 2. Reinforce doors and frames to receive non-templated, mortised, and surface-mounted door hardware.
  - 3. Comply with applicable requirements in ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
  - 4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

## **2.5 HOLLOW METAL DOORS**

- A. Fabrication Provisions: Fabricate doors not less than 1-3/4 in (44 mm) thick, of seamless hollow construction unless otherwise indicated. Construct doors with smooth surfaces without visible joints or seams on exposed faces.
  - 1. Glazed Lites: Factory cut openings in doors.
- B. Door Face Sheets:
  - 1. Metallic-coated steel sheet, minimum 0.053 in (1.3 mm) (16 gage) thick for doors in the following locations:
    - a. Exterior doors.
  - 2. Cold-rolled steel sheet, minimum 0.042 in (1.10 mm) (18 gage) thick for doors in the following locations:
    - a. Interior doors.
- C. Core Construction:
  - 1. Steel-Stiffened Core: 0.026 in (0.7 mm) (22 gage) thick, steel vertical stiffeners of same material as face sheets extending full-door height, with vertical webs spaced not more than 6 in (150 mm) apart, spot welded to face sheets a maximum of 5 in (125 mm) on centers. Spaces filled between stiffeners with mineral-fiber insulation.
  - 2. Fire Door Core: As required to provide fire-protection indicated.

3. Thermal-Rated (Insulated) Core: Typical at Exterior doors and otherwise indicated, provide doors fabricated with thermal-resistance value (R-value) of not less than 4.0 deg F by h by sq ft/Btu (0.704 K by sq m/W) according to ASTM C 1363.
- D. Vertical Edges:
1. Single Acting Doors: Beveled 1/8 in in 2 in (3 mm in 50 mm).
  2. Double Acting Doors: Round vertical edges with 2-1/8 in (53 mm) radius.
- E. Top and Bottom Channels: Closed with continuous channels, minimum 0.053 in (1.3 mm) (16 gage) thick, of same material as face sheets and spot welded to both face sheets.
1. Spot weld metal channel not more than 6 inches (150 mm) on center.
- F. Exterior doors shall be closed flush at the top edge. Seal joints in top edges of door against water penetration. Where required for attachment for weatherstripping, a flush closure channel shall also be provided at the bottom edge.
1. Openings shall be provided in the bottom closure channel of exterior doors to permit the escape of trapped moisture.
- G. Hardware Reinforcement: Fabricate from same material as door. Minimum thickness of steel reinforcing plates for following hardware:
1. Hinges and Pivots: 0.167 in (4.2 mm) (7 gage) thick by 1-1/2 in wide by 6 in (38 mm by 150 mm) longer than hinge, secured by not less than 6 spot welds.
  2. Strikes, Flush Bolts, and Closers: 0.093 in (2.3 mm) (12 gage).
  3. Surface-Mounted Hold-Open Arms and Panic Devices: 0.093 in (2.3 mm) (12 gage).
- H. Glass Molding and Stops: Provide frame for glazed openings between face sheets continuously around perimeter of glass opening and weld to face sheets.
1. Form frame with integrally formed stop on security side.
  2. Miter corners, weld, and grind smooth.
  3. Do not overlap frame molding on face of door.
  4. Use same materials as door face sheet for frame and loose stop for flush glazing.
- I. Louvers: Stationary louvers constructed with inverted V-shaped or Y-shaped blades with blades or baffles and frame formed of same materials as door face sheet. Fabricate louvers and mount flush into doors without overlapping moldings on surface of door face sheets. Provide internal support recommended by manufacturer. Provide louvers with minimum of 50% free air area.
1. Automatic Louvers at Fire-Rated Doors: Louvers constructed with movable blades closed by actuating fusible link, and listed and labeled for use in fire-rated door assemblies of type and fire-resistance rating indicated by same testing and inspecting agency that established fire-resistance rating of door assembly.
- J. Transom Panels: Provide panels of same materials, construction, and finish as specified for doors.

## 2.6 HOLLOW METAL FRAMES

- A. Fabrication Provisions:

1. Fabricate frames of construction indicated below.
2. Close contact edges of corner joints tight with faces mitered and full-profile continuously welded.
  - a. “Knock-down” frame construction is not acceptable and shall not be used.
3. Close contact edges of stops butted or mitered.
4. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

**B. Joinery:**

1. Fabrication Quality Standard: Head-to-jamb joints according to ANSI/NAAMM-HMMA 820 for either of following fabrication techniques with:
  - a. Saw-mitered corners, full-profile continuously welded.
  - b. Machine-mitered corners, full-profile continuously welded.
2. Externally or internally weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and seamless.
3. Internally weld rabbet and soffits continuously; grind, fill, dress, and make smooth.
4. Use of gusset or splice plates as substitute for fully welding is not permitted.

**C. Materials and Thickness:**

1. Metallic-coated steel sheet, 0.067 in (1.7 mm) (14 gage) thick for frames in the following locations:
  - a. Exterior frames.
2. Cold-rolled steel sheet for frames in the following locations:
  - a. Interior frames.
3. Thickness for Cold-Rolled Steel Sheet Frames:
  - a. 48 in (1200 mm) Wide or Less: 0.053 in (1.3 mm) (16 gage) thick.
  - b. More than 48 in (1200 mm) Wide: 0.067 inch (1.7 mm) (14 gage) thick.
4. Sidelight and Transom Frames: Closed tubular members with no visible face seams or joints fabricated from same type and thickness of material as adjacent door frame.
5. Interior Borrowed-Light Frames: Fabricated from 0.053 in (1.3 mm) (16 gage) thick cold-rolled steel sheet.

**D. Stops and Moldings:**

1. Form corners with butted or mitered hairline joints.
2. Provide around glazed lites where indicated.
  - a. Fixed frame moldings on outside of exterior doors and frames and on secure side of interior doors and frames.
  - b. Loose stops and moldings on inside of hollow metal work so that glass can be removed independently.

3. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.
- E. Hardware Reinforcement: Fabricate from same material as frame. Minimum thickness of steel reinforcing plates for following hardware:
1. Hinges and Pivots: 0.167 in (4.2 mm) (7 gage) thick by 1-1/2 in wide by 6 in (38 mm by 150 mm) longer than hinge, secured by not less than 6 spot welds.
  2. Strikes, Flush Bolts, and Closers: 0.093 in (2.3 mm) (12 gage).
  3. Surface-Mounted Hold-Open Arms and Panic Devices: 0.093 in (2.3 mm) (12 gage).
- F. Head Reinforcement: Provide minimum 0.093 in (2.3 mm) (12 gage) thick, steel channel or angle stiffener for opening widths more than 48 in (1200 mm).
- G. Jamb Anchors:
1. Types: Fabricated of same material as frame:
    - a. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 in (1.10 mm) (18 gage) thick.
    - b. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 in (1.10 mm) (18 gage) thick, with corrugated or perforated straps not less than 2 in (50 mm) wide by 10 in (250 mm) long.
    - c. Postinstalled Expansion Type for In-Place Concrete or Masonry: Countersunk, flat or oval head exposed screws and bolts with expansion shields or inserts, minimum 3/8 in (10 mm) diameter bolts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
  2. Quantity and Location:
    - a. Stud-Wall Type: Locate anchors not more than 18 in (450 mm) from top and bottom of frame. Space anchors not more than 32 in (800 mm) on centers and as follows:
      - 1) Three anchors per jamb up to 60 in (1500 mm) high.
      - 2) Four anchors per jamb from 60 to 90 in (1500 to 2250 mm) high.
      - 3) Five anchors per jamb from 90 to 96 in (2250 to 2400 mm) high.
      - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 in (600 mm) or fraction thereof above 96 in (2400 mm) high.
      - 5) Two anchors per head for frames above 42 in (1050 mm) wide and mounted in metal-stud partitions.
    - b. Masonry Type: Locate anchors not more than 18 in (450 mm) from top and bottom of frame. Space anchors not more than 32 in (800 mm) on centers and as follows:
      - 1) Two anchors per jamb up to 60 in (1500 mm) high.
      - 2) Three anchors per jamb from 60 to 90 in (1500 to 2250 mm) high.
      - 3) Four anchors per jamb from 90 to 120 in (2250 to 3000 mm) high.
      - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 in (600 mm) or fraction thereof above 120 in (3000 mm) high.

- c. Postinstalled Expansion Type for In-Place Concrete or Masonry: Locate anchors not more than 6 in (150 mm) from top and bottom of frame and not more than 26 in (650 mm) on centers.
- H. Floor Anchors: Formed from same material as frames welded to bottom of jambs and mullions with not less than 4 spot welds, not less than 0.0428 in (1.10 mm) (18 gage) thick, and as follows, terminating bottom of frames at finish floor surface:
  - 1. Monolithic Concrete Slabs: Clip type anchors, with two holes to receive fasteners.
  - 2. Separate Topping Concrete Slabs: Adjustable type anchors with extension clips, allowing not less than 2 in (50 mm) height adjustment.
- I. Shipping Spreader Bars: Attach two removable metal spreader bars across bottom of frames, tack welded to jambs and mullions.
- J. Door Silencers: Except on weatherstripped doors, drill holes to receive door silencers furnished under Division 08 Section "Door Hardware". Keep holes clear during construction.
  - 1. Single-Door Frames: Strike jamb for 3 door silencers.
  - 2. Double-Door Frames: Head jamb for 2 door silencers.

## **2.7 STEEL FINISHES**

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for cleaning, treating, priming, and when specified, finishing.
- B. Finish products specified in this Section after fabrication.
- C. Metallic-Coated Steel Surface Preparation: Clean surfaces with non-petroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to primer to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.
  - 1. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- D. Non-Coated Steel Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning"; remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 3, "Power Tool Cleaning," or SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- E. Prime Coat Finish: Apply manufacturer's standard primer specified below immediately after surface preparation and pretreatment.
  - 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.
- F. Field-Applied Coatings: As specified in Division 09 Section "Painting".

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. ANSI/NAAMM-HMMA 840.
  - 2. NFPA 80 for fire-rated doors and frames.
  - 3. NFPA 105 for smoke control doors and frames.
  - 4. DHI A115.IG.
  - 5. Respective manufacturer's written installation instructions.
  - 6. Accepted submittals.
  - 7. Contract Documents.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
- B. Pre-Installation Tolerances: Prior to installation, adjust and securely brace hollow metal frames for squareness, alignment, twist, and plumbness to following:
  - 1. Squareness: Plus or minus 1/16 in (1.5 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
  - 2. Alignment: Plus or minus 1/16 in (1.5 mm), measured at jambs on a horizontal line parallel to plane of wall.
  - 3. Twist: Plus or minus 1/16 in (1.5 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
  - 4. Plumbness: Plus or minus 1/16 in (1.5 mm), measured at jambs on a perpendicular line from head to floor.
- C. Hardware Preparation: Drill and tap doors and frames to receive non-templated, mortised, and surface-mounted door hardware.

### **3.4 INSTALLATION OF HOLLOW METAL DOORS AND FRAMES**

- A. Hollow Metal Frames: Install hollow metal frames of size and profile indicated.
  - 1. Setting: Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces and welded-in shipping spreader bars. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

- a. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    - b. Install frames with removable glazing stops located on secure side of opening.
    - c. Install door silencers in frames before grouting.
    - d. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
  2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors or powder actuated fasteners.
  3. Sound-Rated Partitions: Solidly pack mineral-fiber insulation behind frames.
  4. Exterior Walls: Solidly fill space between frames and wall construction with mineral-fiber insulation unless indicated otherwise.
  5. In-Place Masonry or Concrete Construction: Secure frames in place with post-installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
  6. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
  7. Installation Tolerances: Adjust hollow metal frames for squareness, alignment, twist, and plumb to following:
    - a. Squareness: Plus or minus 1/16 in (1.5 mm), measured at rabbet on a line 90 degrees from jamb perpendicular to frame head.
    - b. Alignment: Plus or minus 1/16 in (1.5 mm), measured at jambs on a horizontal line parallel to plane of wall.
    - c. Twist: Plus or minus 1/16 in (1.5 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    - d. Plumbness: Plus or minus 1/16 in (1.5 mm), measured at jambs at floor.
- B. Hollow Metal Doors: Provide insulated doors at exterior and non-insulated at interior locations. Fit accurately in frames, within following clearances:
1. Jambs and Head: 1/8 in (3 mm) plus or minus 1/16 in (1.5 mm).
  2. Between Edges of Pairs of Doors: 1/8 in (3 mm) plus or minus 1/16 in (1.5 mm).
  3. Between Bottom of Door and Top of Threshold: Maximum 3/8 in (10 mm).
  4. Between Bottom of Door and Top of Finish Floor Covering or Top of Structure (No Threshold): Maximum 3/4 in (19 mm).
- C. Glazing:
1. Comply with installation requirements in Division 08 Section "Glazing".
  2. Secure stops with countersunk flat or oval head machine screws spaced uniformly not more than 6 in (150 mm) on center and not more than 2 in (50 mm) on centers from each corner.

### 3.5 ADJUSTMENTS

- A. Final Adjustments: Remove and replace defective hollow metal work, including work that is warped, bowed, or otherwise unacceptable.

- B. Prime Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of primer compatible with paint specified in Division 09 Section "Painting".
- C. Metallic-Coated Surfaces: Prepare and repair damaged galvanized coatings on fabricated and installed hollow metal work with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- D. Field-Applied Coatings: As specified in Division 09 Section "Painting".

**END OF SECTION**

## **SECTION 08 1216**

### **INTERIOR ALUMINUM FRAMES**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section includes interior aluminum frames for doors and glazing installed in gypsum board partitions and supplementary items necessary for installation.
- B. Related Section:
  - 1. Division 08 Section "Interior Storefront" for interior aluminum storefront installations.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, fire-rating (if applicable) finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work. Include the following:
  - 1. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
  - 2. Locations of reinforcements and preparations for hardware.
  - 3. Details of each different wall-opening condition.
  - 4. Details of anchorages, joints, field splices, and connections.
  - 5. Details of accessories.
  - 6. Details of moldings, removable stops, and glazing.
  - 7. Details of conduits and preparations for power, signal, and control systems.
- C. Samples for Initial Selection: For units with factory-applied finishes.
  - 1. Include similar Samples of seals, gaskets, and accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
  - 1. Framing Member: 12 in (300 mm) long.
  - 2. Corner Fabrication: 12 by 12 in (300 by 300 mm) long, full-size window corner, including full-size sections of extrusions with factory-applied color finish.
- E. Schedule: Use same designations indicated on Drawings. Coordinate with door hardware schedule and glazing.

### **1.3 INFORMATIONAL SUBMITTALS**

- A. Product Test Reports for Fire-Rated Assemblies : Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
- B. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.

### **1.4 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: To include in maintenance manuals.

### **1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 10years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Fire-Rated Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
- C. Smoke- and Draft-Control Assemblies: At corridors, smoke barriers, and smoke partitions, provide assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
  - 1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at the tested pressure differential of 0.3-inch wg (75 Pa) of water.

### **1.6 PROJECT CONDITIONS**

- A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

### **1.7 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

### **1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic. Store frames under cover at Project site.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
- B. Available Manufacturers: Subject to compliance with requirements of Contract Documents as judged by the Architect, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those listed.
  - 1. Dual Lock Partition Systems, Inc.; Avalon International Aluminum.
  - 2. Frameworks Manufacturing Inc.; a Div. of ASSA ABLOY.
  - 3. RACO Interior Products, Inc.
  - 4. Western Integrated Materials, Inc.
  - 5. Wilson Partitions.

### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

### **2.3 COMPONENTS**

- A. Aluminum Framing: ASTM B 221 (ASTM B 221M), Alloy 6063-T5 or alloy and temper required to suit structural and finish requirements, not less than 0.062 in (1.6 mm) thick.
- B. Door Frames: Extruded aluminum, reinforced for hinges, strikes, and closers.
  - 1. Fire-Protection Rating: Fabricate aluminum frame assemblies with a cold-formed, primed, interior steel liner.
- C. Glazing Frames: Extruded aluminum, for glazing thickness indicated.
- D. Ceiling Tracks: Extruded aluminum.
- E. Trim: Extruded aluminum, not less than 0.062 in (1.6 mm) thick, with removable snap-in casing trim, glazing stops, and door stops without exposed fasteners.

### **2.4 ACCESSORIES**

- A. Fasteners: Aluminum, nonmagnetic, stainless-steel or other noncorrosive metal fasteners compatible with frames, stops, panels, reinforcement plates, hardware, anchors, and other items being fastened.
- B. Door Silencers: Manufacturer's standard continuous mohair, wool pile, or vinyl seals.
- C. Smoke Seals for Fire-Rated Installations: Intumescent strip or fire-rated gaskets.
  - 1. Color:

- D. Glazing Gaskets: Manufacturer's standard extruded or molded plastic, to accommodate glazing thickness indicated.
- E. Glazing: Comply with requirements in Division 08 Section "Glazing."
- F. Hardware: Comply with requirements in Division 08 Section "Door Hardware".

## **2.5 FABRICATION**

- A. Provide concealed corner reinforcements and alignment clips for accurately fitted hairline joints at butted or mitered connections.
- B. Factory prepare interior aluminum frames to receive templated mortised hardware; include cutouts, reinforcements, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
  - 1. Fire-Rated Installations: Locate hardware as required by fire-rated label for assembly.
- C. Fabricate frames for glazing with removable stops to allow glazing replacement without dismantling frame.
  - 1. Locate removable stops on the inside of spaces accessed by keyed doors.
- D. Fabricate components to allow secure installation without exposed fasteners.

## **2.6 GENERAL FINISH REQUIREMENTS**

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## **2.7 ALUMINUM FINISHES**

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.
- B. Color Anodic Finish: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.
  - 1. Color: As scheduled or as indicated in interior Design Selections.
- C. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry-film thickness of 1.0 mils (0.025 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
  - 1. Color and Gloss: As scheduled or as indicated in interior Design Selections.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine walls, floors, and ceilings, with Installer present, for conditions affecting performance of the Work.
- B. Verify that wall thickness does not exceed standard tolerances allowed by throat size indicated.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 INSTALLATION**

- A. General: Install interior aluminum frames plumb, rigid, properly aligned, and securely fastened in place; comply with manufacturer's written instructions.
- B. Set frames accurately in position and plumbed, aligned, and securely anchored to substrates.
  - 1. Fire-Rated and Smoke-Control Assemblies: At fire-protection-rated openings, install interior aluminum frames according to NFPA 80 and NFPA 105.
- C. Install frame components in the longest possible lengths; components up to 96 in (2400 mm) long must be one piece.
  - 1. Frames Supported by Suspended Ceiling: Fasten to suspended ceiling grid on maximum 48 in (1220 mm) centers, using sheet metal screws or other fasteners approved by frame manufacturer.
  - 2. Use concealed installation clips to produce tightly fitted and aligned splices and connections.
  - 3. Secure clips to extruded main-frame components and not to snap-in or trim members.
  - 4. Do not leave screws or other fasteners exposed to view when installation is complete.

### **3.3 CLEANING**

- A. Clean exposed frame surfaces promptly after installation, using cleaning methods recommended by frame manufacturer and according to AAMA 609 & 610.
- B. Touch up marred frame surfaces so touchup is not visible from a distance of 48 in (1200 mm). Remove and replace frames with damaged finish that cannot be satisfactorily repaired.

- 3.4 **FINISH SCHEDULE:** As indicated on Interior Finish Legend.

**END OF SECTION**

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Cherokee Nation  
Childers Architect  
2019-07-26

INTERIOR ALUMINUM FRAMES

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## **SECTION 08 1416**

### **PREFINISHED FLUSH WOOD DOORS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Prefinished flush wood doors and supplementary items necessary for installation.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
  2. Include details of core and edge construction, light frames, and trim for openings.
  3. Include factory-finishing specifications.
  4. Include manufacturer's surface preparation instructions.
  5. Indicate scheduled fire doors that cannot qualify for labeling because of design, size, hardware or other reason.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work. Provide dimensioned drawings indicating location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
1. Indicate dimensions and locations of mortises and holes for hardware.
  2. Indicate dimensions and locations of cutouts.
  3. Indicate requirements for door face matching.
  4. Indicate doors to be factory finished and finish requirements.
  5. Indicate fire-protection-ratings for fire-rated doors.
- C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.
1. Wood Veneer Door Faces: Full range of colors available.
  2. Opaque Finish Doors: Full range of colors available.
  3. Plastic Laminate Door Faces: Full range of colors, textures, and patterns available.
  4. Impact Resistant Panel Door Faces: Full range of colors, textures, and patterns available.
- D. Samples for Verification Purposes: For each type of exposed finish required, prepared on Samples of size indicated below.
1. Wood Veneer Doors: Wood veneer factory finishes applied to actual door face materials, approximately 8 in by 10 in (200 mm by 250 mm), for each material and finish. For each wood species and transparent finish, provide set of 3 samples showing typical range of color and grain to be expected in finished work.

2. Opaque Finish Doors: Opaque door facing, 6 in (150 mm) square, for each color selected.
3. Plastic Laminate Doors: Plastic laminate door facing, 6 in (150 mm) square, for each color, texture, and pattern selected.
4. Impact Resistant Panel Doors: Impact resistant panel door facing, 6 in (150 mm) square, for each color, texture, and pattern selected.
5. Corner sections of doors, approximately 8 in by 10 in (200 mm by 250 mm), with door faces and edges representing actual materials to be used.
  - a. Wood Veneer Doors: Samples for each species of wood veneer and solid lumber required.
  - b. Opaque Finish Doors: Samples for each color selected.
  - c. Plastic Laminate Doors: Samples for each color, texture, and pattern of plastic laminate door facing required.
  - d. Impact Resistant Panel Doors: Samples for each color, texture, and pattern of impact resistant panel door facing required.
  - e. Finish door facing samples with same materials proposed for factory-finished doors.
6. Light Frames: Frames for light openings, 6 in (150 mm) long, for each material, type, and finish required.
7. Door Louvers: Louver blade and frame sections, 6 in (150 mm) long, for each material and finish specified.

### **1.3 INFORMATIONAL SUBMITTALS**

- A. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
- B. Qualification Data:
  1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
- C. Warranty: Sample of warranty.
  1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

### **1.4 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: To include in maintenance manuals.

### **1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 10 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.

### **1.6 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.
  1. Participants:

- a. Architect.
  - b. Contractor, including superintendent.
  - c. Installer, including project manager and supervisor.
  - d. If requested, Manufacturer's qualified technical representative.
  - e. Installers of other construction interfaced with Work.
2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
- a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
  - b. Review Contract Document requirements.
  - c. Review approved submittals.
  - d. Review inspection and testing requirements.
  - e. Review environmental conditions and procedures for coping with unfavorable conditions.
  - f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
3. Record discussions, including decisions and agreements, and prepare report.

## **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. General: Comply with requirements of referenced quality standards and manufacturer's written instructions.
  - 1. Package doors individually.
  - 2. Protect doors during transit, storage and handling to prevent damage, soiling and deterioration.
  - 3. Mark each door on top and bottom rail with opening number used on Shop Drawings.

## **1.8 PROJECT CONDITIONS**

- A. Environmental Limitations: Deliver and install doors only when spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during remainder of construction period.

## **1.9 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **1.10 WARRANTY**

- A. Manufacturer's Warranty: Furnish manufacturer's written material and labor warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design and installation of product. Warranty shall also include finishing that may be required due to repair or replacement of defective doors. "Defects" is defined to include but not limited to deterioration or failure to perform as required.
  - 1. Defects include, but are not limited to, the following:

- a. Warping (Bow, Cup, or Twist): Not more than 1/4 in (6 mm) in a 42 by 84 in (1050 by 2100 mm) section.
  - b. Telegraphing of Core Construction: Not more than 0.01 in in a 3 in (0.25 mm in a 75 mm) span in face veneers.
2. Warranty Period: Manufacturer shall warrant the products to be free from material and labor Defects for a period as follows:
  - a. Warranty Period for Solid-Core Interior Doors: Life of installation.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
  1. Algoma Hardwoods, Inc.
  2. Construction Specialties, Inc. (C/S Group)
  3. Eggers Industries.
  4. Marshfield Door Systems, Inc.
  5. Mohawk Flush Doors, Inc.; a Masonite Company.
  6. Oshkosh Architectural Door Company.
  7. VT Industries Inc.

### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

### **2.3 PERFORMANCE REQUIREMENTS**

- A. Fire-Test-Response Characteristics:
  1. Fire Resistance Ratings: Products and construction identical to assemblies tested for fire resistance according to NFPA 252 or UL 10C and included under Category GSZN, Category A, published in Underwriters Laboratories, Inc. (UL) "Fire Resistance Directory"; or listing of another testing and inspecting agency acceptable to authorities having jurisdiction.
  2. Positive Pressure Testing: After 5 minutes into test, neutral pressure level in furnace shall be established at 40 in (1000 mm) or less above sill.
  3. Oversize Fire Rated Door Assemblies: For units exceeding sizes of tested assemblies provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
  4. Availability: If specified as fire-rated and labeled door can be obtained from one manufacturer, no consideration will be given to those manufacturers who are not authorized to manufacture such doors.
  5. Smoke-Control Door Assemblies: Comply with UL 1784.

## **2.4 DOOR CONSTRUCTION, GENERAL**

- A. Product Quality Standard: In addition to standard listed elsewhere, comply with following, unless otherwise specified, for construction, finishes, installation, and other requirements.
  - 1. Quality Standard: Comply with "Architectural Woodwork Standards".
    - a. Provide AWI Quality Certification Program labels and certificates indicating that woodwork, including installation, complies with requirements of grades specified.
    - b. Contract Documents contain selections chosen from options in quality standard and additional requirements beyond those of quality standard. Comply with those selections and requirements in addition to quality standard.
    - c. Typical Doors: WDMA I.S.1-A Performance Grade: Heavy Duty, minimum.
- B. Particleboard Core Doors:
  - 1. Particleboard: ANSI A208.1, Grade LD-2.
  - 2. Blocking: Provide wood blocking as needed to eliminate through-bolting hardware and as follows:
    - a. Top Rail: 5 in (125 mm).
    - b. Bottom Rail: 5 in (125 mm).
    - c. Mid Rail: 5 in (125 mm), in doors indicated to have exit devices.
    - d. Lock Blocks: 5 in by 10 in (125 mm by 250 mm), one for lock and two for exit devices.
- C. Fire-Protection-Rated Doors: Mineral core as required for fire-protection-rating indicated.
  - 1. Edge: Construction with intumescent seals; where positive pressure fire testing is required, edge construction with intumescent seals concealed by outer stile matching door face material and laminated backing at hinge stiles for improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
  - 2. Pairs: Fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Comply with specified requirements for exposed edges.
- D. Structural Composite Lumber Core Doors:
  - 1. Structural Composite Lumber: WDMA I.S.10.
  - 2. Screw Withdrawal, Face: 700 lbf (3100 N).
  - 3. Screw Withdrawal, Edge: 400 lbf (1780 N).
- E. Mineral Core Doors:
  - 1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection-rating indicated.
  - 2. Blocking: Provide fire resistant composite blocking with improved screw-holding capability approved for use in doors of fire-protection-ratings indicated as needed to eliminate through-bolting hardware and as follows:
    - a. Top Rail: 5 in (125 mm).
    - b. Bottom Rail: 5 in (125 mm).

- c. Mid Rail: 5 in (125 mm), in doors indicated to have exit devices.
- d. Lock Blocks: 5 in by 10 in (125 mm by 250 mm), one for lock and two for exit devices.

## **2.5 WOOD VENEER FACED DOORS FOR TRANSPARENT FINISH**

### **A. Interior Solid-Core Doors:**

- 1. Grade: Premium, with Grade AA wood veneer faces.
- 2. Species Cut Selection: As scheduled or as indicated in Design Selections.
  - a. Matching of Adjacent Veneer Leaves: Book or Slip match.
  - b. Assembly of Veneer Leaves on Door Faces: Balance or Center-Balance match.
  - c. Room Match: Match door faces within each separate room or area of building. Corridor door faces do not need to match where they are separated by not less than 20 ft (6 m) or more.
  - d. Pair and Set Match: For doors hung in same opening or separated only by mullions.
  - e. Transom Match: Continuous match.
  - f. Blueprint Match: Where indicated, provide doors with faces produced from same wood veneer flitches as adjacent wood paneling and arranged to provide blueprint match with wood paneling. Comply with requirements in Division 06 Section "Interior Architectural Woodwork".
- 3. Exposed Vertical Edges: Same wood veneer as face veneer with sanded eased edges.
- 4. Horizontal Edges: Unfaced, sanded smooth, with factory applied seal coat.
- 5. Core: Particleboard or mineral core as required by application.
- 6. Construction: 5 plies.
  - a. Stiles and rails bonded to core.
  - b. Entire unit abrasive planed before veneering.
  - c. Faces bonded to core using a hot press.

## **2.6 DOORS FOR OPAQUE FINISH**

### **A. Interior Solid-Core Doors:**

- 1. Grade: Premium.
- 2. Faces: Apply medium-density overlay to standard-thickness, closed-grain, hardwood face veneers.
- 3. Color Selection: As scheduled or as indicated in Design Selections.
- 4. Exposed Vertical and Horizontal Edges: Any closed-grain hardwood with sanded eased edges.
- 5. Core: Particleboard.
- 6. Construction: 5 plies.
  - a. Stiles and rails bonded to core.
  - b. Entire unit abrasive planed before veneering.
  - c. Faces bonded to core using a hot press.

## **2.7 LIGHT FRAMES**

### **A. Wood Beads for Light Openings in Wood Doors:**

1. Description: Manufacturer's standard wood beads and profile. At wood-core doors with 20-minute fire protection ratings, provide wood beads and metal glazing clips approved for such use.
2. Material and Finish: Same veneer species and finish as door faces.
3. Glass: As specified in Division 08 Section "Glazing".

B. Wood Veneered Beads for Light Openings in Fire-Rated Doors:

1. Description: Manufacturer's standard wood veneered, noncombustible beads approved for use in doors of fire protection rating indicated. Include concealed metal glazing clips where required for opening size and fire protection rating indicated.
2. Material and Finish: Same veneer species and finish as door faces.
3. Glass: As specified in Division 08 Section "Glazing".

C. Metal Frames for Light Openings in Fire-Rated Doors:

1. Description: Manufacturer's standard frame formed of 0.048 in (1.2 mm) thick, cold-rolled steel sheet; and approved for use in doors of fire protection rating indicated.
  - a. Color Selection: As scheduled or as indicated in Design Selections.
2. Glass: As specified in Division 08 Section "Glazing".

## 2.8 DOOR LOUVERS

A. Wood Louvers:

1. Description: Manufacturer's standard solid-wood louvers.
2. Material and Finish: Same veneer species and finish as door faces.

B. Metal Louvers:

1. Description: Vision-proof, inverted V louver blades set in continuous metal frame that covers edge of door cutout.
2. Metal: Extruded aluminum.
  - a. Finish: Class II, clear anodic finish, AA-M12C22A31.
3. Metal: Hot-dip galvanized steel, 0.040 in (1.0 mm) thick,
  - 1) Color Selection: As scheduled or as indicated in Design Selections.

C. Metal Louvers for Fire-Rated Doors:

1. Description: Louver with fusible link and closing device listed and labeled for use in doors with fire protection rating of 1-1/2 hours and less; set in continuous metal frame that covers edge of door cutout.
2. Metal: Hot-dip galvanized steel, 0.040 in (1.0 mm) thick,
  - 1) Color Selection: As scheduled or as indicated in Design Selections.

D. Manufacturers:

1. Air Louvers Inc.

2. Anemostat; a Mestek Company.
3. Hiawatha Incorporated.
4. L & L Louvers, Inc.
5. LL Building Products, Inc.; a Division of GAF Materials Corporation.
6. Louvers & Dampers, Inc.; a Mestek Company.
7. McGill Architectural Products.

## **2.9 FABRICATION OF PREFINISHED FLUSH WOOD DOORS**

- A. Fabrication Quality Standards: In addition to standards listed elsewhere, comply with following, unless otherwise specified:
  1. NFPA 80 for fire-rated doors.
  2. DHI-WDHS-3 and DHI A115-W series standards for hardware.
- B. Factory Fitting: Factory fit doors to suit frame opening sizes indicated according to installation quality standards. Do not trim stiles and rails in excess of limits permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining with seal coat.
- C. Hardware:
  1. Factory machine doors for hardware that is not surface applied according to installation quality standards.
  2. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
  3. For doors scheduled to have electrical locks, provide built-in **1/4 in (6 mm)** diameter raceway through doors, from lockset location to nearest hinge location, for low voltage wiring for doors scheduled to have electric locks.
- D. Transom Panels: Fabricate matching panels of same construction, exposed surfaces, and finish as specified for associated doors. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.
- E. Openings: Cut and trim openings through doors in factory.
  1. Light Openings: Trim openings with moldings of material and profile indicated.
  2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 08 Section "Glazing".
  3. Louvers: Factory-install louvers in prepared openings.

## **2.10 FACTORY FINISHING OF DOORS**

- A. General:
  1. Comply with referenced quality standard for factory finishing.
  2. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
  3. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on edges of cutouts and mortises.
- B. Grade: Provide finishes of same grades as items to be finished.

- C. Wood Veneer Faced Doors for Transparent Finish: As scheduled or as indicated in Design Selections.
- D. Doors for Opaque Finish: As scheduled or as indicated in Design Selections.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.
  - 1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
  - 2. Reject doors with defects.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. NFPA 80 for fire-rated doors.
  - 2. NFPA 105 for smoke control doors.
  - 3. Respective manufacturer's written installation instructions.
  - 4. Accepted submittals.
  - 5. Contract Documents.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

### **3.4 INSTALLATION OF FLUSH WOOD DOORS**

- A. Factory-Fitted Door Clearances: Fit accurately in frames, within following clearances for all doors (smoke control, fire-rated, and non-fire-rated):
  - 1. Jambs and Head: 1/8 in (3 mm) maximum.
  - 2. Between Edges of Pairs of Doors: 1/8 in (3 mm) maximum.
  - 3. Between Bottom of Door and Top of Threshold: Maximum 3/8 in (10 mm).
  - 4. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 in (19 mm).
  - 5. Between Bottom of Door and Top of Finish Surface (No Threshold) when the bottom of the door is more than 38 in (965 mm) above the finished floor: Maximum 3/8 in (10 mm) or as specified by the manufacturer's label service procedure.
- B. Hardware: As specified in Division 08 Section "Door Hardware".

- C. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

### **3.5 ADJUSTING**

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

### **3.6 FINISH SCHEDULE**

- A. Wood Veneer Faced Doors for Transparent Finish:
  - 1. Species and Cut Selection: Match sample accepted by Architect. Existing

**END OF SECTION**

## **SECTION 08 3113**

### **ACCESS DOORS AND FRAMES**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Access doors and frames and supplementary items necessary for installation.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.
- C. Ceiling Coordination Drawings for Access Doors at Ceilings: Furnish reflected ceiling plans, drawn to scale, on which ceiling-mounted items including access doors and frames, lighting fixtures, diffusers, grilles, speakers, sprinklers, and special trim are shown and coordinated with each other. Indicate method of attaching door frames to surrounding construction.
- D. Samples for Verification Purposes: For each door face material, at least 3 in by 5 in (75 mm by 125 mm) in size, in specified finish.
- E. Access Door and Frame Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

##### **1.3 INFORMATIONAL SUBMITTALS**

- A. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.

##### **1.4 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: To include in maintenance manuals.

##### **1.5 QUALITY ASSURANCE**

- A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics per the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
  - 1. NFPA 252 or UL 10B for vertical access doors and frames.
  - 2. ASTM E 119 or UL 263 for horizontal access doors and frames.
- B. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated.

## **1.6 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.
- B. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed plumbing, mechanical, or other concealed work, and indicate in the schedule specified in "Submittals" Article.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
  - 1. Metal Doors and Frames:
    - a. Acudor Products, Inc.
    - b. Babcock-Davis.
    - c. Dur-Red Products.
    - d. J. L. Industries, Inc.
    - e. Karp Associates, Inc.
    - f. Larsen's Manufacturing Company.
    - g. Maxam Metal Products, Ltd.
    - h. Milcor Inc.
    - i. Nystrom, Inc.
    - j. Williams Brothers Corporation of America.
  - 2. Glass-Fiber-Reinforced Gypsum (GFRG) Doors and Frames:
    - a. Chicago Metallic Corporation.

- B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

## **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

## **2.3 STEEL MATERIALS**

- A. Steel Plates, Shapes, and Bars: ASTM A 36 / A 36M.
  - 1. ASTM A 123 / A 123M, for galvanizing steel and iron products.
  - 2. ASTM A 153 / A 153M, for galvanizing steel and iron hardware.
- B. Steel Sheet: Uncoated cold-rolled steel sheet substrate complying with ASTM A 1008 / A 1008M, Commercial Steel (CS), exposed.
- C. Steel Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
  - 1. Surface Preparation for Steel Sheet: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning", to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning", or SSPC-SP 8, "Pickling".
  - 2. Factory-Primed Finish: Apply shop primer immediately after cleaning and pretreating.
- D. Drywall Beads: Edge trim formed from 0.0299 in (0.7 mm) zinc-coated steel sheet formed to receive joint compound and in size to suit thickness of gypsum board.
- E. Plaster Beads: Casing bead formed from 0.0299 in (0.7 mm) zinc-coated steel sheet with flange formed out of expanded metal lath and in size to suit thickness of plaster.

## **2.4 STAINLESS-STEEL MATERIALS**

- A. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 316. Remove tool and die marks and stretch lines or blend into finish.
  - 1. Finish: Directional No. 4 Satin Finish.

## **2.5 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS**

- A. Non-rated Flush Access Doors and Frames with Exposed Trim:
  - 1. Locations:
    - a. Masonry wall surfaces.
    - b. Ceramic tile wall surfaces.
  - 2. Fabricated from one of the following as scheduled at the end of this Section.

- a. Steel sheet.
    - b. Metallic-coated (galvanized) steel sheet.
  - 3. Door: Minimum 0.075 in (1.9 mm) thick sheet metal, set flush with exposed face flange of frame.
  - 4. Frame: Minimum 0.060 in (1.5 mm) thick sheet metal with 1-1/4 in (32 mm) wide, surface-mounted trim.
  - 5. Hinges: Continuous piano.
  - 6. Lock: Key-operated cylinder.
  - 7. Size: 12 in by 12 in (300 mm by 300 mm); unless otherwise indicated.
  - 8. Basis of Design: Nystrom Building Products, Model NT.
- B. Non-rated Flush Access Doors and Trimless Frames:
- 1. Locations: Wall and ceiling surfaces as scheduled.
    - a. Gypsum board wall and ceiling surfaces.
    - b. Plaster wall and ceiling surfaces.
  - 2. Fabricated from one of the following as scheduled at the end of this Section.
    - a. Steel sheet.
    - b. Stainless-steel sheet.
  - 3. Door: Minimum 0.075 in (1.9 mm) thick sheet metal, set flush with surrounding finish surfaces.
  - 4. Frame: Minimum 0.060 in (1.5 mm) thick sheet metal with drywall bead flange.
  - 5. Hinges: Continuous piano.
  - 6. Lock: Key-operated cylinder.
  - 7. Size: 12 in by 12 in (300 mm by 300 mm); unless otherwise indicated.
  - 8. Basis of Design: Nystrom Building Products, Model NW or NP as applicable.
- C. Fire-Rated, Insulated, Flush Access Doors and Frames with Exposed Trim:
- 1. Locations:
    - a. Masonry wall surfaces.
    - b. Ceramic tile wall surfaces.
  - 2. Fabricated from one of the following as scheduled at the end of this Section.
    - a. Steel sheet.
    - b. Stainless-steel sheet.
  - 3. Fire-Resistance Rating: Not less than 1-1/2 hours.
  - 4. Temperature Rise Rating: 250 deg F (139 deg C) at the end of 30 minutes.
  - 5. Door: Flush panel with a core of mineral-fiber insulation enclosed in sheet metal with a minimum thickness of 0.036 in (0.9 mm).
  - 6. Frame: Minimum 0.060 in (1.5 mm) thick sheet metal with 1 in (25 mm) wide, surface-mounted trim.
  - 7. Hinges: Continuous piano.
  - 8. Automatic Closer: Spring type.

9. Latch: Self-latching device operated by flush key with interior release.
10. Size: 12 in by 12 in (300 mm by 300 mm); unless otherwise indicated.
11. Basis of Design: Nystrom Building Products, Model IT.

D. Fire-Rated, Insulated, Flush Access Doors and Trimless Frames:

1. Locations:
  - a. Gypsum board wall and ceiling surfaces.
  - b. Plaster wall and ceiling surfaces.
2. Fabricated from one of the following as scheduled at the end of this Section.
  - a. Steel sheet.
  - b. Stainless-steel sheet.
3. Fire-Resistance Rating: Not less than 1-1/2 hours.
4. Temperature Rise Rating: 250 deg F (139 deg C) at the end of 30 minutes.
5. Door: Flush panel with a core of mineral-fiber insulation enclosed in sheet metal with a minimum thickness of 0.036 in (0.9 mm).
6. Frame: Minimum 0.060 in (1.5 mm) thick sheet metal with drywall bead.
7. Hinges: Continuous piano.
8. Automatic Closer: Spring type.
9. Latch: Self-latching device operated by flush key with interior release.
10. Size: 12 in by 12 in (300 mm by 300 mm); unless otherwise indicated.
11. Basis of Design:
  - a. Gypsum Board: Nystrom Building Products, Model IW.
  - b. Plaster: Nystrom Building Products, Model IP.

## 2.6 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.
  1. Gypsum Board Locations: For trimless frames with drywall bead, provide edge trim for gypsum board securely attached to perimeter of frames.
  2. Provide mounting holes in frames for attachment of units to metal framing.
  3. Provide mounting holes in frame for attachment of masonry anchors.
- D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
  1. For cylinder lock, furnish two keys per lock and key all locks alike.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer's written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
- B. Advise installers of other work about specific requirements relating to access door and floor door installation, including sizes of openings to receive access door and frame, as well as locations of supports, inserts, and anchoring devices.

### **3.4 INSTALLATION OF ACCESS DOORS AND FRAMES**

- A. Frames with Masonry Anchors: Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.
- B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

### **3.5 ADJUSTING AND CLEANING**

- A. Adjust doors and hardware after installation for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

### **3.6 ACCESS DOOR SCHEDULE**

- A. Provide access doors where indicated on the drawings and as follows:
  - 1. Steel Access Doors:
    - a. Concealed valves and controls for plumbing and HVAC.
    - b. Fire dampers above non-accessible ceilings.
    - c. Motor operated doors and grilles above non-accessible ceilings.
  - 2. Fire-Rated Steel Access Doors:

- a. Rated walls and ceilings.
- 3. Stainless Steel Access Doors:
  - a. Ceramic tile and other damp locations.

**END OF SECTION**

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Cherokee Nation  
Childers Architect  
2019-07-26

ACCESS DOORS AND FRAMES

08 3113 - 8

## **SECTION 08 3213**

### **SLIDING ALUMINUM-FRAMED GLASS DOORS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Sliding aluminum-framed glass door systems and accessories necessary to complete installation.
- B. Refer to Division 8 Section "Glazing" for engineered transition assemblies.

##### **1.2 DEFINITIONS**

- A. ADA/ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disability Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities".

##### **1.3 DELEGATED ENGINEERING REQUIREMENTS**

- A. Contract Documents Design Intent: Drawings and Specifications indicate design intent for products and systems and do not necessarily indicate or specify total Work required. Contract Documents shall not be construed as an engineered design; furnish and install all Work required for a complete installation.
- B. Delegated Engineering Responsibility: Contractor shall employ a qualified professional engineer to provide engineering for products and systems including attachment to building structure required to meet design intent of Contract Documents.
  - 1. Preparation of structural analysis data including engineering calculations, shop drawings and other submittals signed and sealed by the qualified professional engineer.
- C. Delegated Engineering Professional Qualifications: Professional engineer legally authorized to practice in jurisdiction where Project is located and experienced in providing engineering services of kind indicated for products and systems similar to this Project and has a record of successful in-service performance.
- D. Coordination of Work:
  - 1. Product Variations: In the event of minor differences between products and systems of acceptable or available manufacturers, Contractor shall notify Architect of such differences and resolve conflicts in a timely manner. Failure of Contractor to provide notification shall be construed as acceptance of conditions indicated, and changes caused by minor differences between products and Contract Documents shall be included in the Work at no additional cost to Owner.

2. Allowable Adjustments: Minor dimension and profile adjustments may be made in interest of fabrication or erection methods or techniques or ability to satisfy design intent, provided design intent is maintained as determined by Architect. Proposed deviations shall include a detailed analysis of impact to adjacent substrates or other building systems, including related design or construction cost impacts. If accepted by Architect, deviations causing changes in materials, constructability, substrates, or conditions shall be included in the Work at no additional cost to Owner.

#### **1.4 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.
  1. Prepared by manufacturer, not installer.
  2. Include typical unit elevations at 1/2 in (12 mm) scale and details at full scale.
  3. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
  4. Indicate where and how the system deviates from Contract Documents.
  5. Shop drawings shall be certified by an approved qualified engineer currently registered in licensing jurisdiction of the project and a written statement that the framing system conforms to project requirements, applicable codes, and specified conditions.
  6. Provide for information only, material properties and other information needed for structural analysis including computations, prepared, signed, or, and certified by an approved qualified engineer sealed by a professional engineer licensed to practice in the jurisdiction where the project is located.
  7. Submittal shall contain statement explaining how proposed system design will accommodate infiltrated and condensate water.
  8. Design Modifications: If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and Shop Drawings. Do not adversely affect the appearance, durability, or strength of units when modifying details or materials and maintain the general design concept.
  9. Include full-size isometric details of each vertical-to-horizontal intersection of glazed aluminum framing systems, showing the following:
    - a. Mullion details, including reinforcement and stiffeners.
    - b. Joinery details, including concealed welds.
    - c. Anchorage.
    - d. Expansion provisions.
    - e. Glazing details.
    - f. Flashing and drainage details.
    - g. Weather-stripping details.
    - h. Thermal-break details.
- C. Samples for Initial Selection: For units with factory-applied color finishes.

1. Include similar Samples of hardware and accessories involving color selection.
- D. Samples for Verification: For components required, showing full range of color variations for finishes, and prepared on Samples of size indicated below:
  1. Exposed Finishes: 2 by 4 in (50 by 100 mm).
  2. Exposed Hardware: Full-size units.
- E. Full-Size Sample: Architect reserves the right to require full size sample less glass that show fabrication techniques, workmanship, and design of hardware and accessories.
- F. Product Schedule: Use same designations indicated on Drawings.

## **1.5 INFORMATIONAL SUBMITTALS**

- A. Energy Performance Certificates: For sliding doors, accessories, and components, from manufacturer.
  1. Basis for Certification: NFRC-certified energy performance values.
- B. Delegated Engineering Calculations: Informational submittal for products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation; test reports are not acceptable substitute for calculations.
- C. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
  1. Product Approvals: Submit Florida Product Approval or Product Control Notice of Acceptance (NOA) issued by Miami-Dade County Building Code Compliance Office (BCCO) or other product approval acceptable to authorities having jurisdiction for systems used at exterior of building.
- D. Field Quality Control Reports: Written report of testing and inspection required by “Field Quality Control”.
- E. Manufacturer’s Project Acceptance Document: Certification by the manufacturer that its products and systems are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.
- F. Qualification Data:
  1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
- G. Warranty: Sample of warranty.
  1. Provide manufacturer’s written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

## **1.6 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: To include in maintenance manuals.

## **1.7 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 10 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Installer Qualifications:
  - 1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  - 2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
  - 3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.
- C. Energy Performance Standards: Comply with NFRC for minimum standards of energy performance, materials, components, accessories, and fabrication. Comply with more stringent requirements if indicated.
  - 1. Provide NFRC-certified glazed aluminum doors.
- D. Fenestration Standard: Fenestration Standard: Comply with, AAMA/NWWDA 101/I.S.2 for windows, doors, and skylights for definitions and minimum standards of performance, materials, components, accessories, and fabrication. Comply with more stringent requirements if indicated.
- E. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201.
  - 1. Safety-Glass Labeling: Subject to compliance with requirements, permanently mark glass with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety-glass standard with which glass complies.
- F. Glazing Publications: Comply with published recommendations of glass manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.
- G. Preconstruction Sealant Testing: Perform sealant manufacturer's standard tests for compatibility with and adhesion of each material that will come in contact with sealants and each condition.
  - 1. Test a minimum five production-run samples each of metal, glazing, and other material.
  - 2. Prepare samples using techniques and primers required for installed assemblies.
  - 3. Perform tests under environmental conditions that duplicate those under which assemblies will be installed.

4. For materials that fail tests, determine corrective measures necessary to prepare each material to ensure compatibility with and adhesion of sealants including, but not limited to, specially formulated primers. After performing these corrective measures on the minimum number of samples required for each material, retest materials.
- H. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.
1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.
    - a. Show typical components, attachments to building structure, and requirements of installation.
  2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
  3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
  4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
  5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

#### **1.8 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.
1. Participants:
    - a. Architect.
    - b. Contractor, including superintendent.
    - c. Installer, including project manager and supervisor.
    - d. If requested, Manufacturer's qualified technical representative.
    - e. Installers of other construction interfaced with Work.
  2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
    - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
    - b. Review Contract Document requirements.
    - c. Review approved submittals.
    - d. Review inspection and testing requirements.
    - e. Review environmental conditions and procedures for coping with unfavorable conditions.
    - f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.

3. Record discussions, including decisions and agreements, and prepare report.

#### **1.9 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver sliding aluminum-framed glass doors and other exposed elements in padded blankets or other approved protective wrapping.
- B. Protect finish surfaces from damage during handling and installation.

#### **1.10 PROJECT CONDITIONS**

- A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

#### **1.11 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

#### **1.12 WARRANTY**

- A. Manufacturer's Warranty: Furnish manufacturer's written material and labor warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design and installation of product. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

1. Failures include, but are not limited to, the following:

- a. Failure to meet performance requirements.
- b. Structural failures including excessive deflection, water leakage, condensation, and air infiltration.
- c. Noise or vibration created by wind and thermal and structural movements.
- d. Deterioration of metals and other materials beyond normal weathering.
- e. Water penetration through fixed glazing and framing areas.
- f. Failure of operating components.

2. Warranty Period: Manufacturer shall warrant the products listed below to be free from material and labor Defects for the following period of time:

- a. Sliding Door: 5 years from date of Substantial Completion.
- b. Glazing: 10 years from date of Substantial Completion.

- B. Installer's Warranty: Furnish installer's written workmanship warranty signed by an authorized representative using installer's standard form agreeing to provide labor required to repair or replace work which exhibits workmanship defects. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

1. Warranty Period: Installer shall warrant the installation to be free from workmanship Defects for a period of 2 years from date of Substantial Completion.

- C. Factory Applied Finish Warranty: Furnish manufacturer<sup>TMTM</sup>s written warranty signed by an authorized representative using manufacturer<sup>TMTM</sup>s standard form agreeing to repair finish or replace work which exhibits finish defects. "Defects" is defined to include but not limited to deterioration or failure of finish to perform as required.
1. Coverage includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  2. Warranty Period: Manufacturer shall warrant the installation to be free from finish defects for a period of 20 years from date of Substantial Completion.
- D. Factory Applied Finish Warranty for Anodic Finishes: Furnish manufacturer's written warranty signed by an authorized representative using manufacturer's standard form agreeing to repair finish or replace work which exhibits finish defects. "Defects" is defined to include but not limited to deterioration or failure of finish to perform as required.
1. Warranty Period: Manufacturer shall warrant the installation to be free from finish defects for a period of 5 years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
1. Arcadia Inc.
  2. EFCO Corporation, a Pella Company.
  3. Kawneer North America; an Alcoa Company.
  4. Oldcastle Building Envelope.
  5. Peerless Architectural Windows & Doors.
  6. YKK AP America Inc.
  7. Wausau Window and Wall Systems.
- B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.
1. Sliding Aluminum Framed Glass Doors: Arcadia Inc; ULT5000 Series Architectural Sliding Doors.

## **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

## **2.3 PERFORMANCE REQUIREMENTS**

- A. General Performance: Engineer products and systems to withstand loads within limits of allowable working stresses of the materials involved under conditions indicated and without permanent deformation or failure of materials.
  - 1. As required to comply with most stringent structural, air-infiltration, and water-resistance performance requirements for Project, based on largest sliding door size for Project.
- B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:
  - 1. Minimum Performance Class: Class AW.
  - 2. Minimum Performance Grade: Not less than the highest design pressure required for Project.
- C. Design Loads: Engineer to withstand design loads including, but not limited to, gravity, wind, seismic, and erection design loads and thermal movements established by authorities having jurisdiction, applicable local building codes, and as indicated.
  - 1. Structural Movement: Engineer to withstand movements of structure including, but not limited to, drift, twist, column shortening, long-term creep and deflection from uniformly distributed and concentrated live loads. Contractor shall obtain required design data and identify movements accommodated on submittal drawings.
    - a. System shall accommodate plus or minus 3/8 in (10 mm) differential vertical deflection of floors.
- D. Structural Test Performance: Test according to ASTM E 330 as follows:
  - 1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
  - 2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
  - 3. Test Durations: As required by design wind velocity, but not less than 10 seconds.
- E. Deflection of Framing Members:
  - 1. Deflection Limits: Design glass framing system to limit lateral deflections of glass edges to less than 1/175 of glass-edge length or 3/4 in (19 mm), whichever is less, at design pressure based on testing performed according to AAMA/WDMA/CSA 101/I.S.2/A440, Uniform Load Deflection Test, or structural computations.
- F. Windborne-Debris-Impact-Resistance Performance: Comply with impact resistance testing requirements for Wind Zone.

- G. Water Penetration under Static Pressure: No evidence of water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 12 lbf/sf (580 Pa).
  - 1. Maximum Water Leakage: No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters that is drained to exterior.
- H. Thermal Movements: Engineer products and systems to accommodate thermal movements of supporting elements resulting from the following maximum change (range) in ambient and surface temperatures without buckling, damaging stresses, damaging loads on fasteners, failure of operating units to function properly, and other detrimental effects.
  - 1. Temperature Change (Range): 120 deg F (49 deg C), ambient; 180 deg F (82 deg C), material surfaces.
- I. Energy Performance: Certified and labeled energy performance ratings in accordance with NFRC.
  - 1. Air Leakage Resistance: Maximum of 0.30 cfm/sf of area at an inward test pressure of 6.24 lbf/sf (300 Pa) when tested according to AAMA / WDMA / CSA 101 / I.S.2 / A440, Air Leakage Resistance Test.
  - 2. Condensation Resistance: NFRC- certified condensation resistance rating determined according to NFRC 500.
    - a. AAMA Condensation Resistance (CRF): In addition to condensation resistance rating determined according to NFRC 500, provide doors with thermally improved construction that has been tested in accordance with AAMA 1503 and certified by the manufacturer to provide a condensation resistance factor (CRF) of not less than 55.
- J. Sound Transmission Class (STC): Rated for not less than 38 STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.
- K. Outside-Inside Transmission Class (OITC): Rated for not less than 33 OITC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 1332.
- L. Dimensional Tolerances: Engineer products and systems to accommodate dimensional tolerances of framing members and adjacent construction.

## **2.4 MATERIALS**

- A. Aluminum Extrusions: Provide alloy and temper recommended by sliding aluminum-framed glass door manufacturer for strength, corrosion resistance, and application of required finish. Comply with AAMA/WDMA/CSA 101/I.S.2/A440.

- B. Fasteners: Provide fasteners of aluminum, nonmagnetic stainless steel, or other materials warranted by manufacturer to be noncorrosive for SC 3 severe service conditions and compatible with members, trim, hardware, anchors, and other components of sliding aluminum-framed glass doors. Comply with AAMA/WDMA/CSA 101/I.S.2/A440.
  - 1. Exposed Fasteners: Unless unavoidable for applying hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.
- C. Anchors, Clips, and Accessories: Provide anchors, clips, and accessories of aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron for sliding aluminum-framed glass doors, complying with ASTM B 456 or ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- D. Reinforcing Members: Provide aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel reinforcing members that are noncorrosive for SC 3 severe service conditions and that comply with AAMA/WDMA/CSA 101/I.S.2/A440; provide sufficient strength to withstand design pressure indicated.
- E. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action, and completely concealed when sliding aluminum-framed glass door is closed.
- F. Sliding-Type Weather Stripping: Provide woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric. Comply with AAMA 701.
  - 1. Weather Seals: Provide weather stripping with integral barrier fin or fins of semi-rigid, polypropylene sheet, or polypropylene-coated material. Comply with AAMA 702.
- G. Sealant: For sealants required within fabricated sliding doors, provide sliding aluminum-framed glass door manufacturer's standard, permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.
- H. Dividers (False Muntins): Provide extruded-aluminum divider grilles in designs indicated for each sash lite.
  - 1. Type:
    - a. Permanently located at exterior lite.
    - b. Permanently located between insulating-glass lites.
  - 2. Pattern: As indicated on Drawings.
  - 3. Profile: As selected by Architect from manufacturer's full range.
  - 4. Finish: Match aluminum appearance.

## **2.5 SLIDING ALUMINUM-FRAMED GLASS DOORS**

- A. Frames and Door Panels: Fabricated from aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.

## **2.6 GLAZING**

- A. Glass and Glazing System: Comply with Division 08 Section "Glazing" for glass and glazing requirements.
- B. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal and complies with performance requirements.

## **2.7 HARDWARE**

- A. General: Provide manufacturer's standard hardware, fabricated from aluminum, stainless steel or other corrosion-resistant material compatible with aluminum complying with AAMA 907 and designed to smoothly operate, tightly close, and securely lock sliding aluminum-framed glass doors. Do not use aluminum in frictional contact with other metals. Where exposed, provide extruded, cast, or wrought aluminum.
- B. Roller Assemblies: Provide movable panels with adjustable-height roller assemblies, complying with AAMA 906, consisting of self-lubricating, dual tandem manufacturer's standard stainless steel ball-bearing rollers; with two roller assemblies per panel.
- C. Threshold and Sill Cap/Track: Provide extruded-aluminum threshold and stainless steel track of thickness, dimensions, and profile indicated; designed to comply with performance requirements indicated and to drain to the exterior; with manufacturer's standard finish.
- D. Door Pulls: Provide manufacturer's standard extruded-aluminum pull grips.
  - 1. Color and Finish: As selected by Architect from manufacturer's full range.
- E. Lock: Install manufacturer's keyed cylinder lock and multipoint locking device on each movable panel, lockable from the inside. Adjust locking device to allow unobstructed movement of the panel across adjacent panel in the direction indicated.
  - 1. Keying System: All cylinders keyed alike.

## **2.8 ACCESSORY MATERIALS**

- A. Joint Sealants: For installation at perimeter of sliding aluminum-framed glass doors, as specified in Division 07 Section "Joint Sealants".
- B. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30 mils (0.762 mm) thickness per coat.
- C. Thermal Insulating Materials: As specified in Division 07 Section "Thermal Insulation".

## **2.9 FABRICATION**

- A. General: Fabricate in sizes indicated. Include a complete system for assembling components and anchoring doors.

- B. Fabricate sliding aluminum-framed glass doors that are reglazable without dismantling panel framing.
- C. Weather Stripping: Provide operable panels with a double row of sliding weather stripping in horizontal rails and double-row weather stripping in meeting or jamb stiles. Provide compression-type weather stripping at the perimeter of each movable panel where sliding-type weather stripping is not appropriate.
  - 1. Provide weather stripping locked into extruded grooves in door panels or frames.
- D. Weep Holes: Provide weep holes and internal drainage passages to conduct infiltrating water to exterior.
- E. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.
- F. Factory-Glazed Fabrication: Glaze doors in the factory where practical and possible for applications indicated. Comply with requirements in Division 08 Section "Glazing" and with AAMA/WDMA/CSA 101/I.S.2/A440.
- G. Glazing Stops: Provide snap-on glazing stops coordinated with Division 08 Section "Glazing" and with glazing system indicated. Provide glazing stops to match panel frames.

## **2.10 GENERAL FINISH REQUIREMENTS**

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## **2.11 ALUMINUM FINISHES**

- A. Finish designations prefixed by "AA" conform to the system established by the Aluminum Association for designating aluminum finishes.
  - 1. Selections: As scheduled or as indicated in Design Selections.
- B. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
- C. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
- D. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions. Provide dry film thickness, primers, color coats and clear coats required to comply with performance requirements and warranty periods indicated.

1. PVDF Fluoropolymer Finish: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat.
2. FEVE Fluoropolymer Finish: Fluoropolymer finish complying with AAMA 2605 and containing 100 percent fluorinated ethylene vinyl ether (FEVE) resin in color coat.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.
  1. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
  2. Verify rough opening dimensions, levelness of sill plate, and operational clearances.
  3. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight installation.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  1. Respective manufacturer's written installation instructions.
  2. Accepted submittals.
  3. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.
  1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer, applying sealant or tape, or installing nonconductive spacers as recommended by manufacturer for this purpose.
  2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

### **3.4 INSTALLATION OF SLIDING ALUMINUM-FRAMED GLASS DOORS**

- A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing doors, hardware, accessories, and other components.

- B. Install sliding aluminum-framed glass doors level, plumb, square, true to line, without distortion, warp or rack of frames and panels, or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing, vapor retarders, air barriers, water/weather barriers, and other adjacent construction.
- C. Set sill members in bed of sealant or with gaskets, as indicated, to provide weathertight construction.
- D. Install sliding aluminum-framed glass doors and components to drain condensation, water penetrating joints, and moisture migrating within doors to the exterior.

### **3.5 FIELD QUALITY CONTROL**

- A. **Manufacturer's Field Service:** Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.
  - 1. **Manufacturer's Technical Representative Qualifications:** Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.
- B. **Testing Agency:** Engage a qualified independent testing agency to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense.
- C. **Testing Agency:** The Owner may employ and pay a qualified independent testing agency to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense.
  - 1. Before installation of interior finishes, glazed aluminum framing systems shall be tested in accordance with Division 01 Section "Field Test for Water Leakage".
- D. Prepare test and inspection reports.

### **3.6 ADJUSTING, CLEANING, AND PROTECTION**

- A. Lubricate hardware and moving parts.
- B. Adjust operating panels and screens (if applicable) to provide a tight fit at contact points and weather stripping for smooth operation, without binding, and a weathertight closure.
- C. Adjust hardware for proper alignment, smooth operation, and proper latching without unnecessary force or excessive clearance.
- D. Clean aluminum surfaces immediately after installing sliding doors. Comply with manufacturer's written recommendations for final cleaning and maintenance. Avoid damaging protective coatings and finishes. Remove nonpermanent labels, and clean surfaces.

- E. Clean glass immediately after installing sliding aluminum-framed glass doors. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels and clean surfaces.
- F. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- G. Protect sliding door surfaces from contact with contaminating substances resulting from construction operations. During construction, monitor sliding door surfaces adjacent to and below exterior concrete and masonry surfaces for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact sliding door surfaces, remove contaminants immediately according to manufacturer's written instructions.
- H. Refinish or replace sliding aluminum-framed glass doors with damaged finishes.
- I. Replace damaged components.

**END OF SECTION**

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**SLIDING  
ALUMINUM-  
FRAMED  
GLASS DOORS**

**08 3213 - 16**

## **SECTION 08 34 00**

### **SPECIAL FUNCTION DOORS**

#### **PART 1 - 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. Interior Aluminum-Framed Top-Hung Sliding Doors
- B. Related Sections:
  - 1. Section 08 14 16 – Flush Wood Door

##### **1.03 REFERENCES**

- A. ANSI – American National Standards Institute
  - 1. ANSI 156.18 Materials and Finishes
  - 2. ANSI A117.1 Specifications for making buildings and facilities usable by physically handicapped people.
- B. BHMA – Builders Hardware Manufacturers Association
- C. DHI – Door and Hardware Institute
- D. NFPA – National Fire Protection Association
  - 1. NFPA 80 – Fire Doors and Windows
  - 2. NFPA 101 – Life Safety code
  - 3. NFPA 105 – Smoke and Draft Control Door Assemblies
  - 4. NFPA 252 – Fire Tests of Doors Assemblies
- E. AWS – Architectural Woodwork Standards

#### **1.04 SUBMITTALS**

- A. Comply with Section 01 33 00 – Submittal Procedures
- B. Product Data: Submit manufacturer's product data, including installation instructions.
- C. Shop Drawings: Submit manufacturer's shop drawings, including plans, elevations, sections, and details, indicating dimensions, tolerances, materials, components, hardware, finish, options, and accessories. Shop Drawings to show required blocking by others.
- D. Samples: Submit manufacturer's samples of the following sliding door components:
  - 1. Door veneer or laminate sample.
  - 2. Aluminum Frame finish sample.
- E. Manufacturer's Certification: Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application.
- F. Warranty Documentation: Submit manufacturer's standard warranty.
- G. Test Reports: Submit acoustical reports or UL1784 as applicable.

#### **1.05 QUALITY ASSURANCE**

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of interior aluminum frames and doors.
- B. Source: Obtain sliding aluminum framed doors and hardware from single source.
- C. Manufacturer's Qualifications: Manufacturer regularly engaged for past 5 years in manufacture of sliding doors similar to that specified.

#### **1.06 PERFORMANCE**

- A. Aluminum perimeter frames with integral acoustic seals.
- B. Soft self-closing mechanism integrated with top track.
- C. Concealed door guide.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Delivery and Acceptance Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

- B. Notify manufacturer immediately of any shipping damage.
- C. Storage and Handling Requirements:
  - 1. Store and handle materials in accordance with manufacturer's instructions.
  - 2. Keep materials in manufacturer's original, unopened containers and packaging until installation.
  - 3. Store materials in clean, dry area indoors.
  - 4. Protect materials and finish during storage, handling, and installation to prevent damage.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Acceptable Manufacturers: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".

- 1) AD System
- 2) Algoma Hardwoods, Inc.
- 3) Construction Specialties, Inc. (C/S Group)
- 4) Eggers Industries.
- 5) Marshfield Door Systems, Inc.
- 6) Mohawk Flush Doors, Inc.; a Masonite Company.
- 7) Oshkosh Architectural Door Company.
- 8) VT Industries Inc.

### **2.02 INTERIOR SLIDING ALUMINUM-FRAMED DOORS AND PARTITIONS**

- A. Manufacturer:
  - 1. Scheduled Manufacturer: ExamSlide™ High Performance Barn (Sliding) Door System by AD Systems.
  - 2. Acceptable Substitute: No Substitution.
- B. Specified Wall Thickness: Refer to Drawings.
- C. Frame Profiles: Extruded aluminum frame "wrap" frame with integral vertical jamb (stile pocket).
- D. Finish:
  - 1. Standard: Painted Hardcoat (Kynar) Finish. Meets AAMA 2604 Standard
  - 2. Colors: Select from Manufacturer standard colors approved by the Architect.

- E. Door Leafs. All Doors to be factory machined for hardware including pilot and function holes.
  - 1. 1-3/4" Flush Wood Door: Reference Spec Section 08200 Wood Doors or other section as applicable.
    - a. Standard stile widths are 6" with a 10" bottom rail.
  - 2. Aluminum Stile & Rail Door: 3-1/2" stiles plus 1/2" stop.
    - a. 10" bottom Rail.
  - 3. Other 1-3/4" Doors.
- F. Door Components:
  - 1. Single Top Track: AD Systems extruded aluminum track by AD Systems
  - 2. Valances: Extruded aluminum with integral end caps
    - a. Standard square valance.
  - 3. Top Rollers: tandem nylon roller sized to match door weight
  - 4. Concealed Floor Guide: Integral Jamb floor guide by AD Systems
  - 5. Soft-Closer: Soft and self-closing damper mechanism at [one] or [both] sides of door leaf
  - 6. Handles:
- G. Accessories:
- H. Specifier Notes: Specify required accessories. Delete accessories not required, all accessories listed below are optional.
- I. Door Locks:
  - 1. Not Required
- J. Automatic Door Bottom for improved acoustical performance
- K. Additional hardware functionality can be accommodated. Please contact AD Systems with your hardware requirements and we evaluate system compatibility and create specification language.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Examine wall openings to receive sliding doors for plumb, level, and square. Note: Finish door operation will be affected by out of tolerance framing.

- B. Verify dimensions of wall openings.
- C. Examine surfaces to receive top and bottom guide.
- D. Notify Architect of conditions that would adversely affect installation or subsequent use of sliding doors.
- E. Do not begin installation until unacceptable conditions are corrected.
- F. Base of door side to be flush or minimal. Rubber Base acceptable.

### **3.02 INSTALLATION**

- A. Install sliding doors in accordance with manufacturer's instructions at locations indicated on the Drawings.
- B. Install sliding doors plumb, level, square, and in proper alignment.
- C. Install sliding doors to close against walls without gaps
- D. Install sliding doors to open and close smoothly.
- E. Anchor sliding doors securely in place to supports. Required: Fire treated 2 x 6 blocking required full length of track.

### **3.03 ADJUSTING**

- A. Adjust sliding doors for proper operation in accordance with manufacturer's instructions.
- B. Adjust sliding doors to operate smoothly without binding.
- C. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.

### **3.04 CLEANING**

- A. Clean sliding doors promptly after installation in accordance with manufacturer's instructions.
- B. Do not use harsh cleaning materials or methods that could damage materials or finish.

### **3.05 PROTECTION**

- A. Protect installed sliding doors from damage during construction.

**END OF SECTION**

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**SPECIAL FUNCTION DOORS**

**08 3400-6**

**SECTION 08 4110**  
**INTERIOR STOREFRONT**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes: Interior storefront (interior glazed aluminum partitions) and supplementary items necessary for installation.
- B. Related Section:
  - 1. Division 08 Section "Interior Aluminum Frames" for aluminum frames used for doors and glazing installed in gypsum board partitions.

**1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

**1.3 INFORMATIONAL SUBMITTALS**

- A. Welding Certifications: Qualification certificates required by "Quality Assurance" Article. Include names of firms and personnel certified.
- B. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.

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**INTERIOR STOREFRONT**

#### **1.4 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 10 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS qualification requirements and the following:
  - 1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum".

#### **1.5 PROJECT CONDITIONS**

- A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

#### **1.6 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
  - 1. EFCO Corporation, a Pella Company.
  - 2. Kawneer North America; an Alcoa Company.
  - 3. Oldcastle BuildingEnvelope.
  - 4. YKK AP America Inc.
- B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.
  - 1. Kawneer North America; an Alcoa Company; Trifab VG 450, 1-3/4 in (44 mm) face, 4-1/2 in (113 mm) depth, glass in center.

#### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials

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**INTERIOR STOREFRONT**

## **2.3 PERFORMANCE REQUIREMENTS**

- A. Structural Loads: Provide glazed aluminum partition systems capable of withstanding uniform load of 5 lbs per sq. ft. (25 kg/square m) based on testing manufacturer's standard system in assemblies similar to those indicated for this Project.
  - 1. Deflection of framing members normal to wall plane is limited to 1/175 of clear span for spans up to 13 ft 6 in (4 m) and to 1/240 of clear span plus 1/4 in (6 mm) for spans greater than 13 ft 6 in (4 m) or an amount that restricts edge deflection of individual glazing lites to 3/4 in (19 mm) whichever is less.

## **2.4 MATERIALS**

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
  - 1. Sheet and Plate: ASTM B 209 / B 209M.
  - 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 / B 221M.
  - 3. Extruded Structural Pipe and Tubes: ASTM B 429 / B 429M.
  - 4. Structural Profiles: ASTM B 308 / B 308M.
  - 5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.
- B. Internal Steel Reinforcement for High Spans: Manufacturer's standard zinc-rich, corrosion-resistant primer, complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
  - 1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
  - 2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
  - 3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.
- C. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
- D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- E. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

## **2.5 GLAZING**

- A. Glazing: Provide glass of types and thicknesses indicated. Fabricate glass to sizes required for openings indicated with edge clearances and tolerances complying with manufacturer's recommendations. Comply with Division 08 Section "Glazing".

## **2.6 FABRICATION**

- A. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- B. Framing Members: Fabricate components that, when assembled, have the following characteristics:
  - 1. Profiles that are sharp, straight, and free of defects or deformations.
  - 2. Accurately fitted joints with ends coped or mitered.
  - 3. Physical and thermal isolation of glazing from framing members.
  - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
  - 5. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
  - 6. Fabricate for flush glazing (without projecting stops).
- C. Door Frames: Reinforce as required to support loads imposed by door operation and for installing hardware.
  - 1. Provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.
- D. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## **2.7 ALUMINUM FINISHES**

- A. Finish designations prefixed by "AA" conform to the system established by the Aluminum Association for designating aluminum finishes.
  - 1. Color Selections: As scheduled or as indicated in Design Selections.
- B. Baked Enamel or Powder Coated Finish at Interior Surfaces: At Contractor's option, provide baked enamel or powder coated finish at interior surfaces complying with AAMA 2604 except with a minimum dry film thickness of 1.2 mils (0.03 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
  - 1. Selection: Match exterior mullions unless indicated otherwise.
- C. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions. Provide dry film thickness, primers, color coats and clear coats required to comply with performance requirements and warranty periods indicated.
  - 1. PVDF Fluoropolymer Finish: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat.

- 2. FEVE Fluoropolymer Finish: Fluoropolymer finish complying with AAMA 2605 and containing 100 percent fluorinated ethylene vinyl ether (FEVE) resin in color coat.
- D. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.
- E. Color Anodic Finish: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer's written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.
  - 1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer, applying sealant or tape, or installing nonconductive spacers as recommended by manufacturer for this purpose.
  - 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

### **3.4 EXAMINATION**

- A. Examine substrate surfaces to receive glazed aluminum partitions and associated work and conditions under which work will be installed. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to installer. Starting work within a particular area will be construed as installer's acceptance of surface conditions.

### **3.5 INSTALLATION OF GLAZED ALUMINUM PARTITIONS**

- A. General:
  - 1. Do not install damaged components.
  - 2. Fit joints between aluminum components to produce hairline joints free of burrs and distortion.
  - 3. Rigidly secure non-movement joints.
  - 4. Install anchors with separators and isolators to prevent impediments to movement of joints.
  - 5. Do not cut, trim, weld or braze component parts during erection, in any manner which would damage finish, decrease strength or result in visual imperfection or failure in performance of construction.
  - 6. Weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
  - 7. Seal joints within glazed aluminum framing system according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.
- B. Install components plumb and true in alignment with established lines and grades, and without warp or rack. Secure to structure with non-staining and non-corrosive shims, anchors, fasteners, spacers and fillers.
- C. Install glazing as specified in Division 08 Section "Glazing".

### **3.6 ERECTION TOLERANCES**

- A. Erection Tolerances: Install to comply with the following non-accumulating maximum erection tolerances:
  - 1. Location and Plane: Limit variation from true location and plane to 1/8 in (3 mm) in 12 ft (3 mm in 3.7 m); 1/4 in (6 mm) over total length.
  - 2. Alignment:
    - a. Where surfaces abut in line, limit offset from true alignment to 1/16 in (1.5 mm).
    - b. Where surfaces meet at corners, limit offset from true alignment to 1/32 in (0.8 mm).
- B. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 in (3 mm).

**3.7 ARCHITECTURAL METAL FINISH SCHEDULE:** As indicated on the Interior Finish Legend.

**END OF SECTION**

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**INTERIOR STOREFRONT**

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**INTERIOR STOREFRONT**

## **SECTION 08 4216**

### **INTERIOR ALUMINUM ENTRANCE DOORS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Interior aluminum entrance doors and supplementary items necessary for installation.

##### **1.2 DEFINITIONS**

- A. ADA/ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disability Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities".

##### **1.3 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.
- C. Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of aluminum entrance door hardware, as well as procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
- D. Samples for Initial Selection: For units with factory-applied color finishes.
- E. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

##### **1.4 INFORMATIONAL SUBMITTALS**

- A. Welding Certifications: Qualification certificates required by "Quality Assurance" Article. Include names of firms and personnel certified.
- B. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.

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**INTERIOR  
ALUMINUM  
ENTRANCE  
DOORS**

## **1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 10 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS qualification requirements and the following:
  - 1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum".
- C. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

## **1.6 PROJECT CONDITIONS**

- A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

## **1.7 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
  - 1. EFCO Corporation, a Pella Company.
  - 2. Kawneer North America; an Alcoa Company.
  - 3. Oldcastle BuildingEnvelope.
  - 4. YKK AP America Inc.
- B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.
  - 1. Aluminum Entrance Door System; Narrow Stile: Kawneer 190 Standard Entrances.
  - 2. Aluminum Entrance Door System; Medium Stile: Kawneer 350 Standard Entrances.
  - 3. Aluminum Entrance Door System; Wide Stile: Kawneer 500 Standard Entrances.
  - 4. Heavy-Duty Aluminum Entrance Door System; Medium Stile: Kawneer 350 Tuffline Entrances.

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5. Heavy-Duty Aluminum Entrance Door System; Wide Stile: Kawneer 500 Tuffline Entrances.

## **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

## **2.3 MATERIALS**

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
  1. Sheet and Plate: ASTM B 209 / B 209M.
  2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 / B 221M.
  3. Extruded Structural Pipe and Tubes: ASTM B 429 / B 429M.
  4. Structural Profiles: ASTM B 308 / B 308M.
  5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.
- B. Bronze Cladding: ASTM B 36, alloy UNS No. C28000 (muntz metal, 60 percent copper); minimum 0.04 in (1.0 mm) thick.
- C. Brass Cladding: ASTM B 36, alloy UNS No. C26000 (cartridge brass, 70 percent copper); minimum 0.04 in (1.0 mm) thick.
- D. Stainless Steel Cladding: ASTM A 240 / A 240M, austenitic stainless steel, Type 316; minimum 0.04 in (1.0 mm) thick.

## **2.4 GLAZING**

- A. Glazing: Provide glass of types and thicknesses indicated. Fabricate glass to sizes required for openings indicated with edge clearances and tolerances complying with manufacturer's recommendations. Comply with Division 08 Section "Glazing".

## **2.5 ALUMINUM ENTRANCE DOOR SYSTEMS**

- A. Standard-Duty Aluminum Entrance Doors: Manufacturer's standard-duty manual-swing operation entrance door system.
  1. Door Construction: 1-3/4 in (44.5 mm) overall thickness, with minimum 0.125 in (3.2 mm) thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
  2. Door Design: Narrow stile; 2-1/8 in (54 mm) nominal width at vertical stiles.
  3. Door Design: Medium stile; 3-1/2 in (88.9 mm) nominal width at vertical stiles.
  4. Door Design: Wide stile; 5 in (127 mm) nominal width at vertical stiles.
    - a. Accessible Doors: Smooth surfaced for width of door in area within 10 in (255 mm) above floor or ground plane.

5. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets. Provide non-removable glazing stops on outside of door.
  6. Door Hardware: As specified in Division 08 Section "Door Hardware".
- B. Heavy-Duty Aluminum Entrance Doors: Manufacturer's heavy-duty manual-swing operation entrance door system.
1. Door Construction: 2 in (50.8 mm) overall thickness, with minimum 0.188 in (3.2 mm) thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded.
  2. Door Design: Medium stile; 3-1/2 in (88.9 mm) nominal width at vertical stiles.
  3. Door Design: Wide stile; 5 in (127 mm) nominal width at vertical stiles.
    - a. Accessible Doors: Smooth surfaced for width of door in area within 10 in (255 mm) above floor or ground plane.
  4. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets. Provide non-removable glazing stops on outside of door.
  5. Door Hardware: As specified in Division 08 Section "Door Hardware".

## 2.6 ACCESSORY MATERIALS

- A. Joint Sealants: For installation at perimeter of aluminum entrance doors, as specified in Division 07 Section "Joint Sealants".
- B. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30 mils (0.762 mm) thickness per coat.

## 2.7 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Welds shall be of adequate strength and durability, with jointing tight, flush, smooth and clean. Weld behind finished surfaces so as to cause no distortion and/or discoloration on the finished side. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
  1. Profiles that is sharp, straight, and free of defects or deformations.
  2. Accurately fitted joints with ends coped or mitered.
  3. Physical isolation of glazing from framing members.
  4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
  5. Provisions for field replacement of glazing. Provide minimum clearances and depth of glazing packets as recommended by glass manufacturer for thickness and type of glass indicated.
  6. Fasteners, anchors, and connection devices that are concealed from view.

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- D. Door Frames: Provide tubular and channel frame entrance door frame assemblies, as indicated, with welded or mechanical joints in accordance with manufacturer's standards. Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
  - 1. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.
- E. Reinforce doors as required for installing entrance door hardware.
- F. Hardware Installation: Factory-install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

## **2.8 FINISHES, GENERAL**

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of accepted Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of accepted Samples and are assembled or installed to minimize contrast.

## **2.9 ALUMINUM FINISHES**

- A. Finish designations prefixed by "AA" conform to the system established by the Aluminum Association for designating aluminum finishes.
  - 1. Selections: As scheduled or as indicated in Design Selections.
- B. Baked Enamel or Powder Coated Finish at Interior Surfaces: At Contractor's option, provide baked enamel or powder coated finish at interior surfaces complying with AAMA 2604 except with a minimum dry film thickness of 1.2 mils (0.03 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
  - 1. Selection: Match exterior mullions unless indicated otherwise.
- C. High-Performance Organic Finish: High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions. Provide dry film thickness, primers, color coats and clear coats required to comply with performance requirements and warranty periods indicated.
  - 1. PVDF Fluoropolymer Finish: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat.

2. FEVE Fluoropolymer Finish: Fluoropolymer finish complying with AAMA 2605 and containing 100 percent fluorinated ethylene vinyl ether (FEVE) resin in color coat.

D. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

E. Color Anodic Finish: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.

## **2.10 COPPER-ALLOY FINISHES**

A. Finish designations for copper alloys comply with the system established for designating copper-alloy finish systems defined in NAAMM's "Metal Finishes Manual for Architectural and Metal Products".

B. Buffed Finish, Lacquered: M21-06x (Mechanical Finish: buffed, smooth specular; Coating: clear organic, air drying, as specified below).

C. Hand-Rubbed Finish, Lacquered: M31-M34-06x (Mechanical Finish: directionally textured, fine satin; Mechanical Finish: directionally textured, hand rubbed; Coating: clear organic, air drying, as specified below).

D. Medium-Satin Finish, Lacquered: M32-06x (Mechanical Finish: directionally textured, medium satin; Coating: clear organic, air drying, as specified below).

E. Statuary Conversion Coating over Satin Finish: M31-C55-06x (Mechanical Finish: directionally textured, fine satin; Chemical Finish: conversion coating, sulfide; Coating: clear, organic, air drying, as specified below)[, with color matching Architect's sample].

1. Clear, Organic Coating: Lacquer specified for copper alloys, applied by air spray in two coats per manufacturer's written instructions, with interim drying, to a total thickness of 1 mil (0.025 mm).

## **2.11 STAINLESS STEEL FINISHES**

A. General: Remove tool and die marks and stretch lines or blend into finish. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

B. Directional Satin Finish: No. 4.

C. Reflective, Directional Polish: No. 7.

D. Mirrorlike Reflective, Nondirectional Polish: No. 8.

E. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer's written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.
  - 1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer, applying sealant or tape, or installing nonconductive spacers as recommended by manufacturer for this purpose.
  - 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

### **3.4 INSTALLATION OF ALUMINUM ENTRANCE DOORS**

- A. General:
  - 1. Do not install damaged components.
  - 2. Fit joints between aluminum components to produce hairline joints free of burrs and distortion.
  - 3. Rigidly secure non-movement joints.
  - 4. Install anchors with separators and isolators to prevent impediments to movement of joints.
  - 5. Do not cut, trim, weld or braze component parts during erection, in any manner which would damage finish, decrease strength or result in visual imperfection or failure in performance of construction.
  - 6. Weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.

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7. Seal joints within glazed aluminum framing system according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.
- B. Install components plumb and true in alignment with established lines and grades, and without warp or rack. Secure to structure with non-staining and non-corrosive shims, anchors, fasteners, spacers and fillers.
- C. Install doors to produce smooth operation and tight fit at contact points.
  1. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.
- D. Install glazing as specified in Division 08 Section "Glazing".

### **3.5 ERECTION TOLERANCES**

- A. Erection Tolerances: Install to comply with the following non-accumulating maximum erection tolerances:
  1. Location and Plane: Limit variation from true location and plane to 1/8 in in 12 ft (3 mm in 3.7 m); 1/4 in (6 mm) over total length.
  2. Alignment:
    - a. Where surfaces abut in line, limit offset from true alignment to 1/16 in (1.5 mm).
    - b. Where surfaces meet at corners, limit offset from true alignment to 1/32 in (0.8 mm).
- B. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 in (3 mm).

### **3.6 ADJUSTING**

- A. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer.
  1. For entrance doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 in (75 mm) from the latch, measured to the leading door edge.

### **3.7 ARCHITECTURAL METAL FINISH SCHEDULE:** As indicated in the Interior Finish Legend.

**END OF SECTION**

## **SECTION 08 4243**

### **MEDICAL SPECIALTY SLIDING ENTRANCES**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Interior, manually operated, medical specialty sliding entrance door assemblies with emergency breakaway capabilities and supplementary items necessary for installation.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.
- C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

##### **1.3 INFORMATIONAL SUBMITTALS**

- A. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
- B. Warranties: Sample of special warranties.

##### **1.4 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.

##### **1.5 PROJECT CONDITIONS**

- A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

##### **1.6 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

- B. Coordinate sizes and locations of recesses in concrete floors for recessed sliding tracks. Concrete, reinforcement, and formwork requirements are specified in Division 03 Sections.
- C. Templates: Distribute for doors, frames, and other work specified to be factory prepared for installing sliding entrances.

## **1.7 WARRANTY**

- A. Manufacturer's Warranty: Furnish manufacturer's written material and labor warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design of product.
  - 1. "Defects" are defined to include but not limited to deterioration or failure to perform as required and include, but are not limited to, the following:
    - a. Structural failures including, but not limited to, excessive deflection.
    - b. Faulty operation of hardware.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal use.
  - 2. Warranty Period: Two years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to Conditions of the Contract and Division 01 Section "Substitution Procedures".
  - 1. Besam Entrance Solutions; an ASSA ABLOY Group Co.
  - 2. Horton Automatics; a division of Overhead Door Corp.
  - 3. Nabco Entrances, Inc.
  - 4. Record-USA
  - 5. Stanley Access Technologies; Division of The Stanley Works

### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

### **2.3 MATERIALS**

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
  - 1. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221(ASTM B 221M).
  - 2. Sheet and Plate: ASTM B 209(ASTM B 209M).
- B. Sealants and Joint Fillers: As specified in Division 07 Section "Joint Sealants."

- C. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

## **2.4 MEDICAL SPECIALTY SLIDING ENTRANCE ASSEMBLIES**

- A. General: Provide manufacturer's standard sliding entrances including door leaves, sidelites, framing, headers, carrier assemblies, roller tracks, and accessories required for a complete installation.
- B. Opening-Force Requirement, Sliding: Not more than 5 lbf (22.2 N) to fully open door.
- C. Medical Specialty Sliding Entrance:
  - 1. Configuration: Panel configuration as indicated on drawings with breakaway capability
  - 2. Floor Track Configuration: No track across sliding-door opening and at sidelites (trackless).

## **2.5 COMPONENTS**

- A. Framing Members: Manufacturer's standard extruded aluminum, minimum 0.125 in (3.2 mm) thick and reinforced as required to support imposed loads.
  - 1. Nominal Size: 1-3/4 by 4-1/2 in (45 by 115 mm).
  - 2. Extruded Glazing Stops and Applied Trim: Minimum 0.062 in (1.6 mm) wall thickness.
- B. Stile and Rail Doors: Manufacturer's standard 1-3/4 in (45 mm) thick glazed doors with minimum 0.125 in (3.2 mm) thick, extruded-aluminum tubular stile and rail members. Mechanically fasten corners with reinforcing brackets that are welded, or incorporate concealed tie rods that span full length of top and bottom rails.
  - 1. Glazing Stops and Gaskets: Manufacturer's standard snap-on, extruded-aluminum stops and preformed gaskets for glazing indicated.
  - 2. Stile Design: Medium stile; 3-1/2 in (90 mm) nominal width.
  - 3. Rail Design: 3-1/2 in (90 mm) nominal height.
  - 4. Muntin Bars: Horizontal tubular rail member for each door; match stile design.
- C. Sidelites: Manufacturer's standard 1-3/4 in (45 mm) deep sidelites with minimum 0.125 in (3.2 mm) thick, extruded-aluminum tubular stile and rail members matching door design and finish.
  - 1. Glazing Stops and Gaskets: Same materials and design as for stile and rail door.
  - 2. Muntin Bars: Horizontal tubular rail member for each sidelite; match stile design.
- D. Glazing: As specified in Division 08 Section "Glazing."
- E. Integral Louver Blinds Unit: 1 in (25 mm) thick insulated glass unit consisting of two 1/8 in (3 mm) tempered glass lites sandwiched with white mini-blinds in air space; blinds to be tilted via external ADA-compliant device both sides of door (unless indicated otherwise) having a force to tilt blinds of less than 2.25 lbf (10 N). Provide integral louver blinds manufacturer's standard framing kit for a complete installation.
  - 1. Manufacturer and Product: Kyler Industries; Screenline series, Model SL20AA (Tilt Only, Dual Operator).

- F. Headers: Fabricated from minimum 0.125 in (3.2 mm) thick extruded aluminum, and extending full width of sliding entrance units to conceal carrier assemblies and roller tracks. Provide hinged or removable access panels for service and adjustment. Secure panels to prevent unauthorized access.
  - 1. Capacity: Capable of supporting doors up to 100 lb (45 kg) per leaf over spans up to 14 ft (4.3 m) without intermediate supports.
  - 2. Provide sag rods for spans exceeding 14 ft (4.3 m).
- G. Carrier Assemblies and Overhead Roller Tracks: Manufacturer's standard carrier assembly that allows vertical adjustment; consisting of nylon- or delrin-covered, ball-bearing-center steel wheels operating on a continuous roller track or of ball-bearing-center steel wheels operating on a nylon- or delrin-covered, continuous roller track. Support doors from carrier assembly by cantilever and pivot assembly. Provide minimum of two ball-bearing roller wheels and two antirise rollers for each active leaf.
- H. Concealed Bottom Rollers: Manufacturer's standard.
- I. Brackets and Reinforcements: Manufacturer's standard, high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- J. Fasteners and Accessories: Manufacturer's standard, corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

## **2.6 HARDWARE**

- A. General: Provide units in sizes and types recommended by sliding entrance and hardware manufacturers for entrances and uses indicated. Finish exposed parts to match door finish unless otherwise indicated.
- B. Positive Latching: Doors shall have automatic positive latching with lever handle operation.
- C. Breakaway Hardware: Provide release hardware that allows indicated panels to swing out in direction of egress to full 90 degrees from sliding mode.
  - 1. Maximum Force to Open Panel: 25 lbf (111 N).
  - 2. Release Position: At any point in sliding door travel.
- D. Limit Arm: Provide to control doors in the swing mode.
- E. Manual Flush Bolts: BHMA A156.16, Grade 1, edge mortised, lever-extension type; located at bottom of each swing-out sidelite.
- F. Weather Stripping: Manufacturer's standard replaceable components.
  - 1. Compression Type: ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
  - 2. Sliding Type: AAMA 701, wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.
- G. Weather Sweeps: Manufacturer's standard, nylon brush sweep mounted to underside of door bottom.

## **2.7 FABRICATION**

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

## **2.8 GENERAL FINISH REQUIREMENTS**

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

- B. Apply anodic finishes to formed-metal after fabrication unless otherwise indicated.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## **2.9 ALUMINUM FINISHES**

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform work according to following, unless otherwise specified:
  - 1. Respective manufacturer's written installation instructions.
  - 2. Approved submittals.
  - 3. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

### **3.4 INSTALLATION**

- A. General: Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.
  - 1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
  - 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous coating.
- B. Install sliding entrances plumb and true in alignment with established lines and grades without warp or rack of framing members and doors. Anchor securely in place.

1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
  2. Set headers, carrier assemblies, tracks, operating brackets, and guides level and true to location with anchorage for permanent support.
- C. Glazing: Install glazing as specified in Division 08 Section "Glazing."
- D. Sealants: Comply with requirements in Division 07 Section "Joint Sealants" for installing sealants, fillers, and gaskets.
1. Set framing members, floor tracks, and flashings in full sealant bed.
  2. Seal perimeter of framing members with sealant.

### **3.5 ADJUSTING**

- A. Adjust operating hardware and moving parts for smooth and safe operation; lubricate as recommended by manufacturer.
- B. Adjust force to open swing panels.

### **3.6 CLEANING AND PROTECTION**

- A. Clean glass and metal surfaces promptly after installation. Remove excess glazing and sealant compounds, dirt, and other substances. Repair damaged finish to match original finish.
- B. Comply with requirements in Division 08 Section "Glazing" for cleaning and protecting glass.

**END OF SECTION**



## **SECTION 08 4400**

### **GLAZED ALUMINUM FRAMING SYSTEMS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Glazed aluminum framing systems and supplementary items necessary for installation.
  - 1. Conventionally glazed aluminum curtain wall and window wall systems.
  - 2. Aluminum entrance doors.

##### **1.2 DEFINITIONS**

- A. ADA/ABA Accessibility Guidelines for Aluminum Entrance Doors: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disability Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities".

##### **1.3 DELEGATED ENGINEERING REQUIREMENTS**

- A. Contract Documents Design Intent: Drawings and Specifications indicate design intent for products and systems and do not necessarily indicate or specify total Work required. Contract Documents shall not be construed as an engineered design; furnish and install all Work required for a complete installation.
- B. Delegated Engineering Responsibility: Contractor shall employ a qualified professional engineer to provide engineering for products and systems including attachment to building structure required to meet design intent of Contract Documents.
  - 1. Preparation of structural analysis data including engineering calculations, shop drawings and other submittals signed and sealed by the qualified professional engineer.
- C. Delegated Engineering Professional Qualifications: Professional engineer legally authorized to practice in jurisdiction where Project is located and experienced in providing engineering services of kind indicated for products and systems similar to this Project and has a record of successful in-service performance.
- D. Coordination of Work:
  - 1. Product Variations: In the event of minor differences between products and systems of acceptable or available manufacturers, Contractor shall notify Architect of such differences and resolve conflicts in a timely manner. Failure of Contractor to provide notification shall be construed as acceptance of conditions indicated, and changes caused by minor differences between products and Contract Documents shall be included in the Work at no additional cost to Owner.

2. Allowable Adjustments: Minor dimension and profile adjustments may be made in interest of fabrication or erection methods or techniques or ability to satisfy design intent, provided design intent is maintained as determined by Architect. Proposed deviations shall include a detailed analysis of impact to adjacent substrates or other building systems, including related design or construction cost impacts. If accepted by Architect, deviations causing changes in materials, constructability, substrates, or conditions shall be included in the Work at no additional cost to Owner.

#### **1.4 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.
  1. Prepared by manufacturer, not installer.
  2. Include typical unit elevations at 1/2 in (12 mm) scale and details at full scale.
  3. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
  4. Indicate where and how the system deviates from Contract Documents.
  5. Shop drawings shall contain seal of a professional engineer currently registered in licensing jurisdiction of the project and a written statement that the framing system conforms to project requirements, applicable codes, and specified conditions.
  6. Provide for information only, material properties and other information needed for structural analysis including computations, prepared, signed, or, and sealed by a professional engineer licensed to practice in the jurisdiction where the project is located.
    - a. Calculations shall include but not limited to the following:
      - 1) Section properties for framing members.
      - 2) Analysis of framing members.
      - 3) Analysis of anchors and embedded anchors in concrete structure.
      - 4) Analysis of stress in structural silicone.
      - 5) Analysis of glass thicknesses and strength.
2. Submittal shall contain statement explaining how proposed system design will accommodate infiltrated and condensate water.
3. Design Modifications: If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and Shop Drawings. Do not adversely affect the appearance, durability, or strength of units when modifying details or materials and maintain the general design concept.
4. Include full-size isometric details of each vertical-to-horizontal intersection of glazed aluminum framing systems, showing the following:
  - a. Mullion details, including reinforcement and stiffeners.

- b. Joinery details, including concealed welds.
  - c. Anchorage.
  - d. Expansion provisions.
  - e. Glazing details.
  - f. Flashing and drainage details.
  - g. Weather-stripping details.
  - h. Thermal-break details.
  - i. Weatherseals within curtainwall framing joinery.
  - j. Perimeter weatherseals and structural seals.
  - k. Interface with other building construction.
  - l. De-glazing and re-glazing procedures.
  - m. Identification and detail of perimeter fire containment system.
5. Submit insert/embed drawings including layout and enlarged details. Include detail and engineering calculations for field modifications due to location and/or omitted inserts/embeds.
- B. Hardware Schedule for Aluminum Entrance Doors: Prepared by or under the supervision of supplier, detailing fabrication and assembly of aluminum entrance door hardware, as well as procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
- C. Samples for Verification Purposes: Provide pairs of samples for each finish type and color on 12 in (300 mm) long sections of extrusions or formed shapes and on 6 in (150 mm) squares of aluminum sheet or plate. Include 2 or more units in each sample set showing the extreme limits of variations expected in color and texture of finish.
- D. Welding Certifications: Qualification certificates required by "Quality Assurance" Article. Include names of firms and personnel certified.
- E. Energy Performance Certificates: For glazed aluminum curtain walls, accessories, and components, from manufacturer.
1. Basis for Certification: NFRC-certified energy performance values for each glazed aluminum curtain wall.
- F. Delegated Engineering Calculations: Informational submittal for products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation; test reports are not acceptable substitute for calculations.
- G. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
- H. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".

- I. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its products and systems are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.
- J. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
- K. Warranty: Sample of warranty.
  - 1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

## **1.2 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: To include in maintenance manuals.
  - 1. Structural-Sealant Glazing: For structural-sealant glazing, include ASTM C 1401 recommendations for post-installation-phase, quality-control program.

## **1.3 MAINTENANCE MATERIAL SUBMITTALS**

- A. Extra Materials: Provide extra materials to designated storage area as directed by Owner. Materials shall comply with same requirements for materials used in construction:
  - 1. One percent of total square footage of each glass type in sizes determined by the Architect and Consultant.
  - 2. Three sets of entrance door operable hardware.
  - 3. 500 ft of typical glazed aluminum framing system glazing gaskets.
  - 4. Two gallons of each architectural metal finish coating system and color for touch up.

## **1.4 QUALITY ASSURANCE**

- A. Installer Qualifications:
  - 1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  - 2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
  - 3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.
    - a. Subcontractor Responsibility: Work included in this Technical Section shall be performed by a qualified single subcontractor solely responsible for engineering, fabrication and installation of the Work.

- B. Welding Qualifications: Qualify procedures and personnel according to AWS qualification requirements and the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel".
  - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum".
- C. Energy Performance Standards: Comply with NFRC for minimum standards of energy performance, materials, components, accessories, and fabrication. Comply with more stringent requirements if indicated.
  - 1. Provide NFRC-certified glazed aluminum curtain walls with an attached label.
- D. Accessible Entrances for Aluminum Entrance Doors: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.
- E. Structural-Sealant Glazing: Comply with ASTM C 1401 "Guide for Structural Sealant Glazing" for design and installation of glazed aluminum wall systems utilizing structural-sealant glazing.
  - 1. Structural-Sealant Joints: Design reviewed and approved by structural-sealant manufacturer.
  - 2. Comply with ASTM C 1135 Standard Test Method for Determining Tensile Adhesion Properties of Structural Sealants.
- F. Preconstruction Testing Service: Provide glazed aluminum curtain walls that comply with test-performance requirements indicated, as evidenced by reports based on Project-specific preconstruction testing by a qualified testing agency.
  - 1. Refer to Division 01 Section "Testing Mock-up For Building Enclosure Systems".
- G. Preconstruction Sealant Testing: Perform sealant manufacturer's standard tests for compatibility with and adhesion of each material that will come in contact with sealants and each condition.
  - 1. Test a minimum five production-run samples each of metal, glazing, and other material.
  - 2. Prepare samples using techniques and primers required for installed assemblies.
  - 3. Perform tests under environmental conditions that duplicate those under which assemblies will be installed.
  - 4. For materials that fail tests, determine corrective measures necessary to prepare each material to ensure compatibility with and adhesion of sealants including, but not limited to, specially formulated primers. After performing these corrective measures on the minimum number of samples required for each material, retest materials.
- H. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.

1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.
  - a. Show typical components, attachments to building structure, and requirements of installation.
2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

#### **1.5 PRE-INSTALLATION CONFERENCE**

A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

1. Participants:
  - a. Architect.
  - b. Contractor, including superintendent.
  - c. Installer, including project manager and supervisor.
  - d. If requested, Manufacturer's qualified technical representative.
  - e. Installers of other construction interfaced with Work.
2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
  - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
  - b. Review Contract Document requirements.
  - c. Review approved submittals.
  - d. Review inspection and testing requirements.
  - e. Review environmental conditions and procedures for coping with unfavorable conditions.
  - f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
3. Record discussions, including decisions and agreements, and prepare report.

#### **1.6 PROJECT CONDITIONS**

A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

## **1.7 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **1.8 WARRANTY**

- A. Manufacturer's Warranty: Furnish manufacturer's written material and labor warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design and installation of product. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

- 1. Failures include, but are not limited to, the following:

- a. Structural failures including, but not limited to, excessive deflection.
    - b. Noise or vibration created by wind and thermal and structural movements.
    - c. Deterioration of metals and other materials beyond normal weathering.
    - d. Water penetration through fixed glazing and framing areas.
    - e. Failure of operating components.

- 2. Warranty Period: Manufacturer shall warrant the products to be free from material and labor Defects for a period of 5 years from date of Substantial Completion

- B. Installer's Warranty: Furnish installer's written workmanship warranty signed by an authorized representative using installer's standard form agreeing to provide labor required to repair or replace work which exhibits workmanship defects. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

- 1. Warranty Period: Installer shall warrant the installation to be free from workmanship Defects for a period of 2 years from date of Substantial Completion.

- C. Factory Applied Finish Warranty for Anodic Finishes: Furnish manufacturer's written warranty signed by an authorized representative using manufacturer's standard form agreeing to repair finish or replace work which exhibits finish defects. "Defects" is defined to include but not limited to deterioration or failure of finish to perform as required.

- 1. Warranty Period: Manufacturer shall warrant the installation to be free from finish defects for a period of 20 years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".

1. Baker Metal Products Inc.
2. Bruce Wall Systems Corporation.
3. C.R. Laurence - US Aluminum.
4. EFCO Corporation, a Pella Company.
5. Harmon Inc.
6. Kawneer North America; an Alcoa Company.
7. Oldcastle BuildingEnvelope.
8. YKK AP America Inc.

- B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

1. Curtain Wall System; Captured Glazing: Kawneer 1600 Wall.
2. Window Wall System; Captured Glazing: Kawneer 2250 IG.
3. Standard-Duty Aluminum Entrance Door System; Medium Stile Hurricane Resistant: Kawneer 350 IR Entrances.

## **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

## **2.3 PERFORMANCE REQUIREMENTS**

- A. General Performance: Engineer products and systems to withstand loads within limits of allowable working stresses of the materials involved under conditions indicated and without permanent deformation or failure of materials.
- B. Design Loads: Engineer to withstand design loads including but not limited to gravity, wind, seismic, and erection design loads and thermal movements established by authorities having jurisdiction, applicable local building codes, and as indicated.
1. Structural Movement: Engineer to withstand movements of structure including, but not limited to: drift, twist, column shortening, long-term creep and deflection from uniformly distributed and concentrated live loads.
    - a. Live Load Deflection: System shall accommodate plus or minus 3/8 in (10 mm) differential vertical deflection of floors.
- C. Structural Test Performance: Test according to ASTM E 330 as follows:
1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
  2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
  3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

D. Deflection of Framing Members:

1. Deflection Normal to Glazing Plane: Limited to  $1/175$  of clear span for spans up to 13 ft 6 in (4050 mm) and to  $1/240$  of clear span plus  $1/4$  in (6 mm) for spans more than 13 ft 6 in (4050 mm) or 1 in (25 mm), whichever is less.
  - a. Exceptions:
    - 1) Net deflection of spans with one glass lite more than 120 in (3000 mm) in height limited to not more than  $3/4$  in (18.75 mm) regardless of overall span.
    - 2) Where a sealant joint occurs between a framing member and a relatively stiff building element, framing member deflection not more than  $1/2$  of nominal joint width, or less if required by sealant manufacturer.
  - b. Span is defined as the distance between anchor centerline.
2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than  $1/8$  in (3 mm).
  - a. Operable Units (Doors or Windows): Provide a minimum  $1/16$  in (1.6 mm) clearance between framing members and operable units.
3. Cantilever Deflection: Where framing members overhang an anchor point, limit deflection to two times the length of cantilevered member, divided by 175.
4. Window Sill Extension Deflection: The center deflection of the window sill extension trim, when subjected to a 250 pound (113 Kg) vertical concentrated load, shall not exceed  $1/4$  in (6 mm). No permanent deformation is allowed when load is removed.
5. Gypsum Board Deflection: Deflection of framing members in a direction normal to wall plane is limited to  $1/360$  of clear span,  $3/4$  in (19 mm) maximum, where gypsum board surfaces are subject to bending.

E. Building Maintenance Equipment: Engineer units supporting building maintenance equipment to resist pull-out and horizontal shear forces transmitted from equipment.

F. Seismic Performance: Withstand the effects of earthquake motions.

G. Water Penetration under Static Pressure for Curtain Wall and Window Wall Systems: No evidence of water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 15 lbf/sf.

H. Water Penetration under Dynamic Pressure for Curtain Wall and Window Wall Systems: No evidence of water penetration through fixed glazing and framing areas when tested according to AAMA 501.1 at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 15 lbf/sf.

1. Maximum Water Leakage: No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters that is drained to exterior.
- I. Thermal Movements: Engineer products and systems to accommodate thermal movements of supporting elements resulting from the following maximum change (range) in ambient and surface temperatures without buckling, damaging stresses, damaging loads on fasteners, failure of operating units to function properly, and other detrimental effects.
    1. Temperature Change (Range): 120 deg F (49 deg C), ambient; 180 deg F (82 deg C), material surfaces.
  - J. Energy Performance: Glazed aluminum curtain wall systems shall have certified and labeled energy performance ratings in accordance with NFRC.
    1. Curtainwall and Storefront Glazing Air Infiltration: Maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sf (0.30 L/s/sm) of fixed wall area as determined according to ASTM E 283 at a minimum static-air-pressure differential of 6.24 lbf/sf (300 Pa).
    2. Exterior Entrance Door Air Infiltration: Maximum air leakage through glazed entrance doors of 1.0 cfm/sq. ft. (5.08 L/s per sq. m) as determined according to ASTM E 283 at a minimum static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa) .
    3. Condensation Resistance: Fixed glazing and framing system shall have thermal break construction and NFRC-certified condensation resistance rating determined according to NFRC 500.
      - a. AAMA Condensation Resistance (CRF): In addition to condensation resistance rating determined according to NFRC 500, provide glazed aluminum wall system with thermally improved construction that has been tested in accordance with AAMA 1503 and certified by the manufacturer to provide a condensation resistance factor (CRF) of not less than 55.
  - K. Dimensional Tolerances: Engineer products and systems to accommodate dimensional tolerances of framing members and adjacent construction.

## **2.4 MATERIALS**

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
  1. Sheet and Plate: ASTM B 209 / B 209M.
  2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 / B 221M.
  3. Extruded Structural Pipe and Tubes: ASTM B 429 / B 429M.
  4. Structural Profiles: ASTM B 308 / B 308M.
  5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.
- B. Steel Internal Reinforcement: Shapes and sizes to suit installation meeting delegated engineered performance requirements, as indicated on Shop Drawings.

1. Structural Shapes, Plates, and Bars: ASTM A 36 / A 36M.
2. Cold-Rolled Sheet and Strip: ASTM A 1008 / A 1008M.
3. Hot-Rolled Sheet and Strip: ASTM A 1011 / A 1011M.
4. Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer, complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

## **2.5 FRAMING SYSTEM**

- A. Framing Members: Manufacturer's standard formed- or extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
  1. Fabrication Method: Factory-fabricated unitized system.
- B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with non-staining, nonferrous shims for aligning system components.
- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.
  1. Use Series 300 Stainless Steel fasteners for joining framing members and fasteners located in wet areas.
  2. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
  3. Reinforce members as required to receive fastener threads.
  4. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.
  5. Window Wall and Storefront: Furnish heavy duty aluminum sill pan with integral welded end dams, typical.
- D. Anchors: Three-way adjustable anchors that accommodate fabrication and installation tolerances in material and finish and are compatible with adjoining materials and recommended by manufacturer.
  1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 / A 123M or ASTM A 153 / A 153M requirements.
- E. Concealed Flashing: Dead-soft, 0.018 in (0.45 mm) thick stainless steel, ASTM A 240 / A 240M of type recommended by manufacturer.
- F. Framing System Gaskets and Sealants: Refer to Division 08 Section "Glazing."
  1. EPDM Gaskets: EPDM shall be isolated from direct contact with silicone; including but not limited to the secondary perimeter silicone seal of insulating glass units.

## 2.6 GLAZING

- A. Glazing: Provide glass of types and thicknesses indicated. Fabricate glass to sizes required for openings indicated with edge clearances and tolerances complying with manufacturer's recommendations. Comply with Division 08 Section "Glazing".
- B. Glazing Gaskets, Spacers, Setting Blocks, Sealant Backings, and Bond Breakers: Manufacturer's standard permanent, non-migrating types compatible with sealants and suitable for joint movement and assembly performance requirements. Comply with Division 08 Section "Glazing".
  - 1. Silicone Sealant Compatibility: When in direct contact with silicone sealants, gaskets, spacers and setting blocks shall be heat cured silicone rubber based material which is chemically compatible and with sufficient hardness for the purpose intended and approved in writing by the glazing and curtain wall manufacturers.
- C. Glazing Sealants: As recommended by manufacturer for joint type.
  - 1. Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 50, neutral-curing silicone formulation compatible with system components with which it comes in contact; and recommended by weatherseal-sealant and curtain-wall manufacturers for this use.
    - a. Joint Movement Capability: Accommodates a 50 percent increase or decrease in joint width at time of application when measured according to ASTM C 719.
    - b. Color: Black, unless otherwise indicated.
  - 2. Bond-Breaker Tape: Manufacturer's standard tetrafluoroethylene-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

## 2.7 ALUMINUM ENTRANCE DOOR SYSTEMS

- A. Heavy-Duty Aluminum Entrance Doors: Manufacturer's heavy-duty manual-swing operation entrance door system designed to coordinate with glazed aluminum wall framing system.
  - 1. Door Construction: 2 in (50.8 mm) overall thickness, with minimum 0.188 in (3.2 mm) thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded.
  - 2. Door Design: Medium stile; 3-1/2 in (87 mm) nominal width at vertical stiles.
    - a. Accessible Doors: Smooth surfaced for width of door in area within 10 in (250 mm) above floor or ground plane.
  - 3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets. Provide non-removable glazing stops on outside of door.
  - 4. Door Hardware:
    - a. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 in (12 mm). Provide cutouts coordinated for operating hardware, with anchors and jamb clips.

- b. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.
- c. Balance of Door Hardware: As specified in Division 08 Section "Door Hardware".

## **2.8 ACCESSORY MATERIALS**

- A. Joint Sealants: For installation at perimeter of glazed aluminum framing systems, as specified in Division 07 Section "Joint Sealants".
- B. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30 mils (0.762 mm) thickness per coat.
- C. Maintenance Equipment Anchors: As specified in Division 11 Section "Building Maintenance Equipment".
- D. Cleaning Agent and Cloth: As recommended by structural-sealant manufacturer.
- E. Linings, Spacers and Sleeves: At dynamic or moving joints, provide type and materials recommended by manufacturer.

## **2.9 FABRICATION**

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Welds shall be of adequate strength and durability, with jointing tight, flush, smooth and clean. Weld behind finished surfaces so as to cause no distortion and/or discoloration on the finished side. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
  - 1. Profiles that is sharp, straight, and free of defects or deformations.
  - 2. Accurately fitted joints with ends coped or mitered.
  - 3. Physical and thermal isolation of glazing from framing members.
  - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
  - 5. Provisions for field replacement of glazing. Provide minimum clearances and depth of glazing packets as recommended by glass manufacturer for thickness and type of glass indicated.
    - a. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural-sealant cures.
  - 6. Fasteners, anchors, and connection devices that are concealed from view.
  - 7. Internal guttering systems or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum framing systems to exterior.

- D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- E. For Factory-Assembled and Glazed Frame Units:
  - 1. Rigidly secure non-movement joints.
  - 2. Seal joints watertight unless otherwise indicated.
  - 3. Factory-install glazing to comply with requirements in Division 08 Section "Glazing".
  - 4. Structural-Sealant Units: Prepare surfaces that will contact structural-sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.
- F. Aluminum Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
  - 1. At exterior doors, provide compression weather stripping at fixed stops.
  - 2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.
- G. Aluminum Entrance Doors: Reinforce doors as required for installing entrance door hardware.
  - 1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
  - 2. At exterior doors, provide weather sweeps applied to door bottoms.
- H. Aluminum Entrance Door Hardware Installation: Factory-install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
- I. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## **2.10 FINISHES, GENERAL**

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Concealed members may be mill finish, providing that they cannot be seen through the glass, do not contact any structural silicone or are not continually exposed to water immersion.
- D. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of accepted Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of accepted Samples and are assembled or installed to minimize contrast.

## **2.11 ALUMINUM FINISHES**

- A. Finish designations prefixed by "AA" conform to the system established by the Aluminum Association for designating aluminum finishes.
  - 1. Selections: As scheduled or as indicated in Design Selections.
- B. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions. Provide dry film thickness, primers, color coats and clear coats required to comply with performance requirements and warranty periods indicated.
  - 1. PVDF Fluoropolymer Finish: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat.
  - 2. FEVE Fluoropolymer Finish: Fluoropolymer finish complying with AAMA 2605 and containing 100 percent fluorinated ethylene vinyl ether (FEVE) resin in color coat.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer's written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.
  - 1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer, applying sealant or tape, or installing nonconductive spacers as recommended by manufacturer for this purpose.
  - 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

### 3.3 PREPARATION

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
  - 1. Furnish inserts for setting in concrete forming, and similar work required to support glazed aluminum wall system.
  - 2. Field measure and verify governing dimensions, including floor elevations, floor-to-floor heights, minimum clearance between wall system and structural frames and other permissible dimensional tolerances in building frame.

### 3.4 INSTALLATION OF GLAZED ALUMINUM FRAMING SYSTEMS

- A. General:
  - 1. Do not install damaged components.
  - 2. Fit joints between aluminum components to produce hairline joints free of burrs and distortion.
  - 3. Rigidly secure non-movement joints.
  - 4. Install anchors with separators and isolators to prevent impediments to movement of joints.
  - 5. Do not cut, trim, weld or braze component parts during erection, in any manner which would damage finish, decrease strength or result in visual imperfection or failure in performance of construction.
  - 6. Weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
  - 7. Seal joints within glazed aluminum framing system according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.
- B. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum framing systems to exterior.
- C. Set continuous sill members and flashing in full sealant bed and install perimeter joint sealants as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.
- D. Install components plumb and true in alignment with established lines and grades, and without warp or rack. Secure to structure with non-staining and non-corrosive shims, anchors, fasteners, spacers and fillers. Maintain minimum clearance of 1 in (25 mm) between inside face of framing system and outside face of building structure.
- E. Aluminum Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
  - 1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.

2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

F. Install glazing as specified in Division 08 Section "Glazing".

### **3.5 ERECTION TOLERANCES**

A. Erection Tolerances: Install to comply with the following non-accumulating maximum erection tolerances:

1. Plumb: 1/8 in per 10 ft (3 mm per 3 m); 1/4 in per 40 ft (6 mm per 12 m).
2. Level: 1/8 in per 10 ft (3 mm per 3 m); 1/4 in per 40 ft (6 mm per 12 m).
3. Alignment:
  - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 in (12 mm) wide, limit offset from true alignment to 1/16 in (1.5 mm).
  - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 in (12 to 25 mm) wide, limit offset from true alignment to 1/8 in (3 mm).
  - c. Where surfaces are separated by reveal or protruding element of 1 in (25 mm) wide or more, limit offset from true alignment to 1/4 in (6 mm).
4. Location and Plane: Limit variation from plane to 1/8 in per 12 ft (3 mm per 3.6 m); 1/2 in (12 mm) over total length.

### **3.6 FIELD QUALITY CONTROL**

A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.

1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.

B. Testing Agency: Engage a qualified independent testing agency to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense.

C. Prepare test and inspection reports.

### **3.7 ADJUSTING OF ALUMINUM ENTRANCE DOORS**

A. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer.

1. For entrance doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 in (75 mm) from the latch, measured to the leading door edge.

3.8 **ARCHITECTURAL METAL FINISH SCHEDULE:** Refer to Exterior Elevation drawings.

**END OF SECTION**

## **SECTION 08 5619**

### **SLIDING PASS WINDOWS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section includes sliding pass windows and supplementary items necessary to complete work required for their installation.
- B. Related Section:
  - 1. Division 08 Section "Overhead Coiling Doors" for roll down fire-rated counter shutters for use with non-fire-rated sliding pass windows located at fire-rated partitions.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.

##### **1.3 INFORMATIONAL SUBMITTALS**

- A. Product Approvals: Submit Florida Product Approval or Product Control Notice of Acceptance (NOA) issued by Miami-Dade County Building Code Compliance Office (BCCO) or other product approval acceptable to authorities having jurisdiction for systems used at exterior of building.
- B. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.

##### **1.4 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.

##### **1.5 PROJECT CONDITIONS**

- A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

## **1.6 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
- B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers/fabricators offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.
- B. Windborne-Debris-Impact-Resistance Performance: Comply with impact resistance testing requirements for Wind Zone.

### **2.3 NON-FIRE RATED HORIZONTAL FRAMELESS SLIDING WINDOW (TYPE SW-1)**

- A. Configuration: Two 1/4 in (6 mm) operable window panes with top and bottom tracks. Recess tracks unless indicated otherwise.
- B. Basis of Design (Product Standard): EPCO; Packaged Glass Door Track Assemblies, Assembly #16; Size(s) as indicated on drawings.
  - 1. Clear anodized aluminum frame finish.
  - 2. Manufacturer's standard ratchet lock with bright chrome finish.
    - a. EPCO Part No. G04-C; include side jambs at both sides (Part No. 730)
  - 3. 1/4 in (6 mm) thick, clear tempered glass windows.
- C. Manufacturers:
  - 1. EPCO
  - 2. Hafele
  - 3. Knape & Vogt

### **2.4 NON-FIRE-RATED HORIZONTAL FRAMED SLIDING WINDOW (TYPE SW-2)**

- A. Two Sliding Panes: Two 1/4 in (6 mm) operable window panes, top hung on nylon guides with frames top and sides; no sill:

1. Manufacturer and Product: Nissen & Co., Inc.; Sliding Serving Windows, Series BP; Size(s) as indicated on drawings.
  - a. Clear anodized aluminum frame finish.
  - b. Manufacturer's standard pin screw lock.
  - c. 1/4 in (6 mm) thick, clear tempered glass windows.
- B. One Sliding Pane; One Fixed Pane: Two 1/4 in (6 mm) window panes (one operable; one fixed), top hung on nylon guides with frames top and sides; no sill:
  1. Manufacturer and Product: Nissen & Co., Inc.; Sliding Serving Windows, Series E; Size(s) as indicated on drawings.
    - a. Clear anodized aluminum frame finish.
    - b. Manufacturer's standard pin screw lock.
    - c. 1/4 in (6 mm) thick, clear tempered glass windows.

## **2.5 FIRE-RATED HORIZONTAL FRAMED SLIDING WINDOW, (TYPE SW-3)**

- A. Manufacturer and Product: Nissen & Co., Inc.; Steel Sliding Fire Windows; Size(s) as indicated.
  1. Steel: Frame and sash shall be fabricated of 16-gage cold rolled steel, conforming with ASTM A366
  2. Weatherstripping: Sliding slash panel shall be fully weatherstripped with silicone treated wool pile or equivalent and vinyl.
  3. Finish: As selected from manufacturers standard finishes.
  4. Glazing: Factory glazed with clear 1/4 in (6 mm) thick wire glass. Wire to be minimum of 24 gage with maximum opening of one square inch and comply per UL requirements. Glass to comply with ANSI Z97.1 and ASTM C1036.
  5. Hardware: Sliding panels shall be furnished with a positive latching 1/8 in (3 mm) thick steel latch, attached to the bottom rail; engaging on a 1/4 in (6 mm) thick keeper that is surface mounted to the sill member.
    - a. Self-Closing Latch: Provide a spring actuated automatic closing device used in conjunction with a 160-degree fusible link assembly mounted on the unit.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  1. Respective manufacturer/fabricator's written installation instructions.

2. Accepted submittals.
  3. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.
- C. Preparation, General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

**END OF SECTION**

## **SECTION 08 7100**

### **DOOR HARDWARE**

#### **PART 1 - 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.
  - b. Sliding doors.
  - c. Gates.
- 2. Electronic access control system components, including:
  - a. Biometric access control reader.
  - b. Electronic access control devices.
- 3. Field verification, preparation and modification of existing doors and frames to receive new door hardware.
- 4. Lead-lining door hardware items required for radiation protection at door openings.
- 5. 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 09 sections for touchup, finishing or refinishing of existing openings modified by this section.
4. Division 13 Section "Radiation Protection" for requirements for lead-lining for door hardware at openings indicated to receive radiation protection.
5. Division 26 sections for connections to electrical power system and for low-voltage wiring.
6. 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 or sample installations of each type of exposed 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. Certificates of Compliance:
  - a. UL listings for fire-rated hardware and installation instructions if requested by Architect or Authority Having Jurisdiction.
  - b. Installer Training Meeting Certification: Letter of compliance, signed by Contractor, attesting to completion of installer training meeting specified in "QUALITY ASSURANCE" article, herein.
  - c. Electrified Hardware Coordination Conference Certification: Letter of compliance, signed by Contractor, attesting to completion of electrified hardware coordination conference, specified in "QUALITY ASSURANCE" article, herein.
- 4. 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) 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).
  - 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 manufacturer of key control system for subsequent delivery to Owner.
- F. 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.
- E. Existing Openings: Where existing doors, frames and/or hardware are to remain, field verify existing functions, conditions and preparations and coordinate to suit opening conditions and to provide proper door operation.

#### **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: LCN 4000 series, 30 years
      - 2) Electrified: 2 years.
    - b. Automatic Operators: LCN, 2 years
    - c. Exit Devices:
      - 1) Mechanical: 3 years.
      - 2) Electrified: 1 year.
    - d. Locksets:
      - 1) Mechanical: Schlage ND series, 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.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURERS**

- A. **NO SUB:** The Owner requires use of certain products for their unique characteristics and project suitability to insure continuity of existing and future performance and maintenance standards. After investigating available product offerings, the Awarding Authority has elected to prepare proprietary specifications. These products are specified with the notation: "No Substitute."
  - 1. Where "No Substitute" is noted, submittals and substitution requests for other products will not be considered.
- B. 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.
- C. 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.
- D. 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. Modification and Preparation of Existing Doors: Where existing door hardware is indicated to be removed and reinstalled.

1. Provide necessary fillers, Dutchmen, reinforcements, and fasteners, compatible with existing materials, as required for mounting new opening hardware and to cover existing door and frame preparations.
  2. Use materials which match materials of adjacent modified areas.
  3. When modifying existing fire-rated openings, provide materials permitted by NFPA 80 as required to maintain fire-rating.
- C. 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.
- D. Cable and Connectors: Hardwired Electronic Access Control Lockset and Exit Device Trim:
1. Data: 24AWG, 4 conductor shielded, Belden 9843, 9841 or comparable.
  2. DC Power: 18 AWG, 2 conductor, Belden 8760 or comparable.
  3. Provide type of data and DC power cabling required by access control device manufacturer for this installation.
  4. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with sufficient number and wire gauge with standardized Molex plug connectors to accommodate electric function of specified hardware. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

## 2.03 HINGES

### A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Ives 5BB series.
2. Acceptable Manufacturers and Products: Hager 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.
11. Provide spring hinges where specified. Provide two spring hinges and one bearing hinge per door leaf for doors 90 inches (2286 mm) or less in height. Provide one additional bearing hinge for each 30 inches (762 mm) of additional door height.

## 2.04 CONTINUOUS HINGES

### A. Stainless Steel

1. Manufacturers:
  - a. Scheduled Manufacturer: Ives.
  - b. Acceptable Manufacturers: Markar, Stanley.
2. Requirements:
  - a. Provide pin and barrel continuous hinges conforming to ANSI/BHMA A156.26., Grade 1.
  - b. Provide pin and barrel continuous hinges fabricated from 14 gauge, type 304 stainless steel.
  - c. Provide twin self-lubricated nylon bearings at each hinge knuckle, with 0.25-inch (6 mm) diameter stainless steel pin.
  - d. Provide hinges capable of supporting door weights up to 600 pounds, and successfully tested for 1,500,000 cycles.
  - e. On fire-rated doors, provide pin and barrel continuous hinges that are classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
  - f. Provide pin and barrel continuous hinges with electrified options as 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.

**B. Cold-Rolled Steel**

**1. Manufacturers:**

- a. Scheduled Manufacturer: Ives.
- b. Acceptable Manufacturers: Markar, Stanley.

**2. Requirements:**

- a. Provide pin and barrel continuous hinges conforming to ANSI/BHMA A156.26., Grade 1.
- b. Provide pin and barrel continuous hinges fabricated from type 1012 cold rolled steel.
- c. Provide twin self-lubricated nylon bearings at each hinge knuckle, with 0.25-inch (6 mm) diameter stainless steel pin.
- d. Provide hinges capable of supporting door weights up to 600 pounds, and successfully tested for 1,500,000 cycles.
- e. On fire-rated doors, provide pin and barrel continuous hinges that are classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
- f. Provide pin and barrel continuous hinges with electrified options as 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.

**C. 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 PIVOT SETS**

- A. Manufacturers:
  - 1. Scheduled Manufacturer: Ives.
  - 2. Acceptable Manufacturers: Dorma, Rixson.
- B. Requirements:
  - 1. Provide pivot sets complete with oil-impregnated top pivot, unless indicated otherwise.
  - 2. Where offset pivots are specified, Provide one intermediate pivot for doors less than 91 inches (2311 mm) high and one additional intermediate pivot per leaf for each additional 30 inches (762 mm) in height or fraction thereof. Intermediate pivots spaced equally not less than 25 inches (635 mm) or not more than 35 inches (889 mm) on center, for doors over 121 inches (3073 mm) high.
  - 3. Provide appropriate model where pivot sets are scheduled at fire rated openings.
  - 4. Provide lead-lined model where pivot sets are specified at lead-lined doors.
  - 5. Provide pivots with electrified options as scheduled in the hardware sets. Provide with sufficient number and wire gage to accommodate electric function of specified hardware. Locate electrified pivot nearest to electrified locking component. If manufacturer of electrified locking component requires another device for power transfer then provide recommended power transfer device and appropriate quantity of pivots.
  - 6. Provide mortar guard for each electric pivot specified, unless specified in hollow metal frame specification.

## **2.07 EMERGENCY HARDWARE**

- A. Double Lipped Strike
  - 1. Manufacturers:
    - a. Scheduled Manufacturer: Ives.
    - b. Acceptable Manufacturers: ABH, Hager.
  - 2. Provide double lip strike offset-hung to allow door to swing open in opposite direction unless detailed otherwise. Size for specific frame depth. Coordinate special latchbolt-hole

location and special template, as required, to operate with mortise lock being used as specified.

3. Provide compatible emergency stop/release as recommended by manufacturer of double lip strike or engineered to operate with double lip strike.

**B. Emergency Stop/Release**

**1. Manufacturers:**

- a. Scheduled Manufacturer: Ives.
- b. Acceptable Manufacturers: Hager, Stanley.

2. Provide emergency stop/release for doors with double lip strikes offset-hung to allow door to swing open in opposite direction unless detailed otherwise.

**2.08 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.

**2.09 SURFACE BOLTS**

**A. Manufacturers:**

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

**B. Requirements:**

1. Surface bolts to have 1" throw for maximum security with concealed mounting that prevents vandalism. Units to be constructed of heavy duty steel and cUL listed up to three (3) hours when used on the inactive door of a pair up to 8' in height.

**2.10 COORDINATORS**

**A. Manufacturers:**

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

**B. Requirements:**

1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.
2. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers, surface vertical rod exit device strikes or other stop mounted hardware. Factory-prepared coordinators for vertical rod devices as specified.

**2.11 CYLINDRICAL LOCKS – GRADE 1**

**A. Manufacturers and Products:**

1. Scheduled Manufacturer and Product: Schlage ND series. – No Substitutions

**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 RHO.
  - b. Tactile Warning (Knurling): Where required by authority having jurisdiction. Provide on levers on exterior (secure side) of doors serving rooms considered to be hazardous.

**2.12 HOSPITAL LATCHES**

**A. Manufacturers and Products:**

1. Scheduled Manufacturer and Product: Schlage HL6E series.
2. Acceptable Manufacturers and Products: ABH 6000 series, Sargent 114P/115P series.

**B. Requirements:**

1. Provide hospital latches conforming to ANSI/BHMA A156 with covers engraved "Push" and "Pull".
2. Provide hospital latches with standard 5 inches (127 mm) backset, unless noted otherwise, with 1/2 inch (13 mm) latch throw. Provide proper latch throw for UL listing at pairs.
3. Dampened paddle action – depression and snap back – to reduce noise associated with lock operation.
4. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.

5. Mount trim with push paddle mounted up and pull paddle mounted down except at psychiatric or security areas provide both paddles mounted down, unless noted otherwise.

## **2.13 EXIT DEVICES**

### **A. Manufacturers and Products:**

1. Scheduled Manufacturer and Product: Von Duprin 98/35A Series – No Substitutions

### **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. 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.
12. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
13. Provide electrified options as scheduled.
14. QM 98/99 Rim Exit Devices: provide devices with damper controlled re-latching to reduce operational noise. Where lever trim is specified, provide damper controlled lever return.
15. 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.
16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.
  - a. Tactile Warning (Knurling): Where required by authority having jurisdiction. Provide on levers on exterior (secure side) of doors serving rooms considered to be hazardous.

## **2.14 ELECTRIC 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.

## **2.15 PASSIVE INFRARED MOTION SENSORS**

**A. Manufacturers and Products:**

1. Scheduled Manufacturer and Product: Schlage SCAN II Series.
2. Acceptable Manufacturers and Products: RCI 915 Series, Securitron XMS Series, Security Door Controls MD-31D Series.

**B. Requirements:**

1. Provide motion sensors as specified in hardware groups.

## **2.16 POWER SUPPLIES**

**A. Manufacturers and Products:**

1. Scheduled Manufacturer and Product: Schlage/Von Duprin PS900 series.
2. Acceptable Manufacturers and Products: Precision ELR series, Sargent 3500 series, Dynalock 5000 series, 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.

## 2.17 **CYLINDERS: MATCH EXISTING KEY SYSTEM**

### A. Manufacturers:

- 1. Scheduled Manufacturer: Schlage SFIC Everest core

### B. Requirements:

- 1. Provide permanent 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.

### C. Construction Keying:

- 1. Temporary Construction Cylinder Keying.
  - a. Provide construction cores that permit voiding construction keys without cylinder removal, furnished in accordance with the following requirements.
    - 1) Split Key or Lost Ball Construction Keying System.
    - 2) 3 construction control keys, and extractor tools or keys as required to void construction keying.
    - 3) 12 construction change (day) keys.
  - b. Owner or Owner's Representative will void operation of temporary construction keys.
- 2. 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.

## 2.18 **KEYING**

- A. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.
- B. For factory registered existing system: Provide cylinders/cores keyed into Owner's existing factory registered keying system.
- C. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

- D. For non-factory existing system: Provide cylinders/cores keyed into Owner's existing keying system managed by Owner's locksmith, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference. Contact:
1. Firm Name:
  2. Contact Person:
  3. Telephone:
- E. 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.
    - b. No Master Keying: Cylinders/cores only operated by change (day) keys.
  2. Forward biting 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) for Schlage Everest 29 until the year, 2029.
  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. SFIC: Permanent Control Keys: 3.
    - c. Master Keys: 6.

## **2.19 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.

## **2.20 KEY MANAGEMENT SOFTWARE**

**A. Manufacturers and Products:**

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

## **2.21 DOOR CLOSERS**

**A. Manufacturers and Products:**

1. Scheduled Manufacturer and Product: LCN 4040XP series – No Substitutions

**B. Requirements:**

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. 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 3/4 inch (19 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.

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 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.

## **2.22 PROTECTION PLATES**

### **A. Manufacturers:**

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

### **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

## **2.23 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.

## **2.24 DOOR STOPS AND HOLDERS**

### **A. Manufacturers:**

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

### **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.

## **2.25 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.

## **2.26 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.

## **2.27 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.

## **2.28 DOOR POSITION SWITCHES**

### **A. Manufacturers:**

1. Scheduled Manufacturer: Schlage.
2. Acceptable Manufacturers: GE-Interlogix, Sargent.

### **B. Requirements:**

1. Provide recessed or surface mounted type door position switches as specified.
2. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches (102 mm) between switch and magnetic locking device.

## **2.29 FINISHES**

### **A. Finish: BHMA 626/652 (US26D); except:**

1. Hinges at Exterior Doors: BHMA 630 (US32D)
2. Continuous Hinges: BHMA 630 (US32D)
3. Continuous Hinges: BHMA 628 (US28)
4. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
5. Protection Plates: BHMA 630 (US32D)
6. Overhead Stops and Holders: BHMA 630 (US32D)
7. Door Closers: Powder Coat to Match
8. Wall Stops: BHMA 630 (US32D)
9. Latch Protectors: BHMA 630 (US32D)
10. Weatherstripping: Clear Anodized Aluminum
11. Thresholds: Mill Finish Aluminum

### **B. Finish: BHMA 625/651 (US26); except:**

1. Hinges at Exterior Doors: BHMA 629 (US32)
  2. Continuous Hinges: BHMA 630 (US32D)
  3. Continuous Hinges: BHMA 628 (US28)
  4. Push Plates, Pulls, and Push Bars: BHMA 629 (US32)
  5. Protection Plates: BHMA 629 (US32)
  6. Overhead Stops and Holders: BHMA 629 (US32)
  7. Door Closers: Powder Coat to Match
  8. Wall Stops: BHMA 629 (US32)
  9. Latch Protectors: BHMA 630 (US32D)
  10. Weatherstripping: Clear Anodized Aluminum
  11. Thresholds: Mill Finish Aluminum
- C. Finish: BHMA 612/639 (US10); except:
1. Continuous Hinges: BHMA 630 (US32D)
  2. Continuous Hinges: BHMA 709 (US10)
  3. Door Closers: Powder Coat to Match
  4. Latch Protectors: BHMA 630 (US32D)
  5. Weatherstripping: Dark Bronze Anodized Aluminum
  6. Thresholds: Extruded Architectural Bronze – Mill Finish
- D. Finish: BHMA 613/640 (US10B); except:
1. Continuous Hinges: US32D (BHMA 630).
  2. Continuous Hinges: BHMA 710 (US10B)
  3. Door Closers: Powder Coat to Match.
  4. Latch Protectors: US32D (BHMA 630).
  5. Weatherstripping: Dark Bronze Anodized Aluminum.
  6. Thresholds: Extruded Architectural Bronze, Oil-Rubbed
- E. Finish: BHMA 605/632 (US3); except:
1. Continuous Hinges: BHMA 630 (US32D)
  2. Door Closers: Powder Coat to Match
  3. Latch Protectors: BHMA 630 (US32D)
  4. Weatherstripping: Gold Anodized Aluminum.
  5. Thresholds: Extruded Architectural Bronze, Polished
- F. Finish: BHMA 606/633 (US4); except:
1. Continuous Hinges: BHMA 630 (US32D)
  2. Continuous Hinges: BHMA 688 (US4)
  3. Door Closers: Powder Coat to Match
  4. Latch Protectors: BHMA 630 (US32D)
  5. Weatherstripping: Gold Anodized Aluminum
  6. Thresholds: Extruded Architectural Bronze – Mill Finish

## **PART 3 - 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. Field verify existing doors and frames receiving new hardware and existing conditions receiving new openings. Verify that new hardware is compatible with existing door and frame preparation and existing conditions.
- C. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- D. 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. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule but not fewer than one intermediate

offset pivot per door and one additional intermediate offset pivot for every 30 inches (750 mm) of door height greater than 90 inches (2286 mm).

- I. 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.
  - 2. Furnish permanent cores to Owner for installation.
- J. Lead Protection: Lead wrap hardware penetrating lead-lined doors. Levers and roses to be lead lined. Apply kick and armor plates on lead-lined doors with adhesive as recommended by manufacturer.
- K. 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.
- L. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- M. 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.
- N. Closer/Holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
- O. 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.
- P. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- Q. 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.
- R. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- S. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- T. 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

Hardware items are referenced in the following hardware. Refer to the above-specifications for special features, options, cylinders/keying, and other requirements.

##### HARDWARE GROUP NO. 003

<u>QTY</u>	<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
1	EA	NOTE		
ALL HARDWARE BY DOOR MANUFACTURER				
ICU BREAKAWAY DOORS, ALL HARDWARE BY DOOR MFR.				

**HARDWARE GROUP NO. 004**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
2	EA	LONG DOOR PULL	9266F 36" 20" STD	630	IVE
-PLEASE CONFIRM IF DOOR MFR. IS PROVIDING ALL HARDWARE					
-COORDINATE ALL HARDWARE WITH DOOR MFR.					

**HARDWARE GROUP NO. 103**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	ENTRANCE LOCK	ND53HD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	188S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

**HARDWARE GROUP NO. 200**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	SET	AUTO FLUSH BOLT	FB31P/FB41P AS REQ	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	ND80HD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	COORDINATOR	COR X FL X MB X HW PREPS X LENGTH AS REQUIRED	628	IVE
2	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
2	EA	PROTECTION PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	MEETING STILE	328AA (2 PCS - 1 SET) HEIGHT AS REQUIRED (OMIT @ NON-RATED DOORS)	AA	ZER
1	EA	GASKETING	188S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

-USE 3/4" LATCHBOLT AT FIRE RATED DOORS.

**HARDWARE GROUP NO. 201**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80HD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	188S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

**HARDWARE GROUP NO. 201C**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80HD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	188S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

**HARDWARE GROUP NO. 201CW**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1HW 5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80HD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	188S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

**HARDWARE GROUP NO. 201W**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1HW 5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80HD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	188S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

**HARDWARE GROUP NO. 203**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80HD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	188S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

**HARDWARE GROUP NO. 203S**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80HD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	OH STOP	900S SERIES X SIZE & MOUNTING AS REQ	630	GLY
1	EA	GASKETING	188S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

**HARDWARE GROUP NO. 214**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
6	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
2	EA	MANUAL FLUSH BOLT	FB458-12"	626	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	ND80HD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	OH STOP	900S SERIES X SIZE & MOUNTING AS REQ (INACTIVE LEAF)	630	GLY
1	EA	SURFACE CLOSER	4040XP SCUSH X MTG BRKT, SPCR & PLATE AS REQ (ACTIVE LEAF)	689	LCN
2	EA	PROTECTION PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	EA	MEETING STILE	328AA (2 PCS - 1 SET) HEIGHT AS REQUIRED	AA	ZER
1	EA	RAIN DRIP	142A DW + 4"	AA	ZER
1	EA	GASKETING	328AA H & J	AA	ZER
2	EA	DOOR SWEEP	8198AA LENGTH AS REQ	AA	ZER
1	EA	THRESHOLD	65A LENGTH AS REQ	A	ZER
1	EA	GASKETING	188S PSA HEIGHT AS REQ (MOUNT ON ASTRAGAL)	BK	ZER

@ DOOR 4000, THE KEYED SIDE WILL BE ON THE STAIR SIDE. FREE EGRESS BACK INTO BUILDING, PER CODE YOU CANNOT LOCK SOMEONE OUT ON A ROOFTOP.

**HARDWARE GROUP NO. 216**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	SET	CONST LATCHING BOLT	FB51P/FB61P AS REQ	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	ND80HD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
2	EA	OH STOP	900S SERIES X SIZE & MOUNTING AS REQ	630	GLY
1	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
2	EA	PROTECTION PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	EA	MEETING STILE	328AA (2 PCS - 1 SET) HEIGHT AS REQUIRED (OMIT @ NON-RATED DOORS)	AA	ZER
1	EA	GASKETING	188S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

**HARDWARE GROUP NO. 303**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PRIVACY LOCK	ND40S RHO	626	SCH
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	188S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

**HARDWARE GROUP NO. 373**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1 4.5 X 4.5	630	IVE
1	EA	PRIVACY LOCK	ND40S RHO	626	SCH
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	188S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

**HARDWARE GROUP NO. 401**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	ND10S RHO	626	SCH
1	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	188S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

**HARDWARE GROUP NO. 401G**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	ND10S RHO	626	SCH
1	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	DOOR BOTTOM	360AA-Z49 LENGTH AS REQ	AA	ZER
1	EA	GASKETING	188S PSA H & J	BK	ZER
-EXTRA GASKETING FOR SOUND					

**HARDWARE GROUP NO. 403**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	ND10S RHO	626	SCH
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	188S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

**HARDWARE GROUP NO. 406**

<b><u>QTY</u></b>		<b><u>DESCRIPTION</u></b>	<b><u>CATALOG NUMBER</u></b>	<b><u>FINISH</u></b>	<b><u>MFR</u></b>
6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	SET	AUTO FLUSH BOLT	FB31P/FB41P AS REQ	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	PASSAGE SET	ND10S RHO	626	SCH
1	EA	COORDINATOR	COR X FL X MB X HW PREPS X LENGTH AS REQUIRED	628	IVE
2	EA	OH STOP	900S SERIES X SIZE & MOUNTING AS REQ	630	GLY
2	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
2	EA	PROTECTION PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	EA	MEETING STILE	328AA (2 PCS - 1 SET) HEIGHT AS REQUIRED (OMIT @ NON-RATED DOORS)	AA	ZER
1	EA	GASKETING	188S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

**HARDWARE GROUP NO. 407G**

<b><u>QTY</u></b>		<b><u>DESCRIPTION</u></b>	<b><u>CATALOG NUMBER</u></b>	<b><u>FINISH</u></b>	<b><u>MFR</u></b>
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	ND10S RHO	626	SCH
1	EA	OH STOP	900S SERIES X SIZE & MOUNTING AS REQ	630	GLY
1	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	DOOR BOTTOM	360AA-Z49 LENGTH AS REQ	AA	ZER
1	EA	GASKETING	188S PSA H & J	BK	ZER

**HARDWARE GROUP NO. 493**

<b><u>QTY</u></b>		<b><u>DESCRIPTION</u></b>	<b><u>CATALOG NUMBER</u></b>	<b><u>FINISH</u></b>	<b><u>MFR</u></b>
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	ND10S RHO	626	SCH
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	188S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

**HARDWARE GROUP NO. 493SW**

<b><u>QTY</u></b>		<b><u>DESCRIPTION</u></b>	<b><u>CATALOG NUMBER</u></b>	<b><u>FINISH</u></b>	<b><u>MFR</u></b>
3	EA	HINGE	5BB1 5 X 4.5	652	IVE
1	EA	PASSAGE SET	ND10S RHO	626	SCH
1	EA	OH STOP	100S SERIES X SIZE & MOUNTING AS REQ	630	GLY
1	EA	GASKETING	188S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

**HARDWARE GROUP NO. 500S**

<b><u>QTY</u></b>		<b><u>DESCRIPTION</u></b>	<b><u>CATALOG NUMBER</u></b>	<b><u>FINISH</u></b>	<b><u>MFR</u></b>
6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	SET	AUTO FLUSH BOLT	FB31P/FB41P AS REQ	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	CLASSROOM LOCK	ND70HD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	COORDINATOR	COR X FL X MB X HW PREPS X LENGTH AS REQUIRED	628	IVE
1	EA	OH STOP	900S SERIES X SIZE & MOUNTING AS REQ	630	GLY
2	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
2	EA	PROTECTION PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	MEETING STILE	328AA (2 PCS - 1 SET) HEIGHT AS REQUIRED (OMIT @ NON-RATED DOORS)	AA	ZER
1	EA	GASKETING	188S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

**HARDWARE GROUP NO. 501**

<b><u>QTY</u></b>		<b><u>DESCRIPTION</u></b>	<b><u>CATALOG NUMBER</u></b>	<b><u>FINISH</u></b>	<b><u>MFR</u></b>
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70HD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	188S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

**HARDWARE GROUP NO. 503**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70HD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	188S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

**HARDWARE GROUP NO. 503W**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1HW 5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70HD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	188S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

**HARDWARE GROUP NO. 507**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70HD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	OH STOP	900S SERIES X SIZE & MOUNTING AS REQ	630	GLY
1	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	188S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

**HARDWARE GROUP NO. 700C**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
6	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
2	EA	PANIC HARDWARE	9847-L-LBR-17 (WDC @ WD) LENGTH & HEIGHT AS REQ	626	VON
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	SFIC RIM CYLINDER	80-159 W/CONST. CORE	626	SCH
2	EA	SURFACE CLOSER	4040XP SCUSH X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
2	EA	PROTECTION PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	SILENCER	SR64	GRY	IVE

**HARDWARE GROUP NO. 701**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PANIC HARDWARE	98-L-17 LENGTH AS REQ	626	VON
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	SFIC RIM CYLINDER	80-159 W/CONST. CORE	626	SCH
1	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

**HARDWARE GROUP NO. 701C**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PANIC HARDWARE	98-L-17 LENGTH AS REQ	626	VON
1	EA	SFIC RIM CYLINDER	80-159 W/CONST. CORE	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

**HARDWARE GROUP NO. 701W**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1HW 5 X 4.5	652	IVE
1	EA	PANIC HARDWARE	98-L-17 LENGTH AS REQ	626	VON
1	EA	SFIC RIM CYLINDER	80-159 W/CONST. CORE	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

**HARDWARE GROUP NO. 711CR**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	FIRE EXIT HARDWARE	98-L-NL-F LENGTH AS REQ	626	VON
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	SFIC RIM CYLINDER	80-159 W/CONST. CORE	626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	188S PSA H & J	BK	ZER

**HARDWARE GROUP NO. 711CRW**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1HW 5 X 4.5	652	IVE
1	EA	FIRE EXIT HARDWARE	98-L-NL-F LENGTH AS REQ	626	VON
1	EA	SFIC RIM CYLINDER	80-159 W/CONST. CORE	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	188S PSA H & J	BK	ZER

**HARDWARE GROUP NO. 715A**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
1	EA	CONT. HINGE	112XY HEIGHT AS REQ	628	IVE
1	EA	PANIC HARDWARE	35A-NL-OP LENGTH AS REQ	626	VON
1	EA	SFIC RIM CYLINDER	80-159 W/CONST. CORE	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	90 DEG OFFSET PULL	8190-O 10"	630	IVE
1	EA	SURFACE CLOSER	4040XP SCUSH X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	SET	SEAL	PERIMETER SEAL BY FRAME MANUFACTURER		
1	EA	DOOR SWEEP	8198AA LENGTH AS REQ	AA	ZER
1	EA	THRESHOLD	65A LENGTH AS REQ	A	ZER

**HARDWARE GROUP NO. 725R**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	FIRE EXIT HARDWARE	98-EO-F LENGTH AS REQ	626	VON
1	EA	SURFACE CLOSER	4040XP SCUSH X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	328AA H & J	AA	ZER
1	EA	RAIN DRIP	142A DW + 4"	AA	ZER
1	EA	DOOR SWEEP	8198AA LENGTH AS REQ	AA	ZER
1	EA	THRESHOLD	65A LENGTH AS REQ	A	ZER
1	EA	GASKETING	188S PSA H & J	BK	ZER

**HARDWARE GROUP NO. 725RW**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1HW 5 X 4.5 NRP	630	IVE
1	EA	FIRE EXIT HARDWARE	98-EO-F LENGTH AS REQ	626	VON
1	EA	SURFACE CLOSER	4040XP SCUSH X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	328AA H & J	AA	ZER
1	EA	RAIN DRIP	142A DW + 4"	AA	ZER
1	EA	DOOR SWEEP	8198AA LENGTH AS REQ	AA	ZER
1	EA	THRESHOLD	65A LENGTH AS REQ	A	ZER
1	EA	GASKETING	188S PSA H & J	BK	ZER

**HARDWARE GROUP NO. 725W**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1HW 5 X 4.5 NRP	630	IVE
1	EA	PANIC HARDWARE	98-EO LENGTH AS REQ	626	VON
1	EA	SURFACE CLOSER	4040XP SCUSH X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	328AA H & J	AA	ZER
1	EA	RAIN DRIP	142A DW + 4"	AA	ZER
1	EA	DOOR SWEEP	8198AA LENGTH AS REQ	AA	ZER
1	EA	THRESHOLD	65A LENGTH AS REQ	A	ZER

**HARDWARE GROUP NO. 731**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PANIC HARDWARE	98-L-BE-17 LENGTH AS REQ	626	VON
1	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

**HARDWARE GROUP NO. 731CR**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	FIRE EXIT HARDWARE	98-L-BE-F-17 LENGTH AS REQ	626	VON
1	EA	SURFACE CLOSER	4040XP SCUSH X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	188S PSA H & J	BK	ZER

**HARDWARE GROUP NO. 800AV**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
2	EA	CONT. HINGE	112XY HEIGHT AS REQ	628	IVE
2	EA	DUMMY PUSH BAR	350 LENGTH AS REQ	626	VON
2	EA	90 DEG OFFSET PULL	8190-O 10"	630	IVE
2	EA	SURFACE CLOSER	4040XP SCUSH X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	SET	SEAL	PERIMETER SEAL BY FRAME MANUFACTURER		
1	SET	ASTRAGAL	MEETING STILE SEAL BY DOOR MANUFACTURER		

**HARDWARE GROUP NO. 801**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PULL PLATE	8303 CTC10" 4"X16"	630	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

**HARDWARE GROUP NO. C700**

<b><u>QTY</u></b>		<b><u>DESCRIPTION</u></b>	<b><u>CATALOG NUMBER</u></b>	<b><u>FINISH</u></b>	<b><u>MFR</u></b>
4	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
2	EA	ELECTRIC HINGE	5BB1HW 4.5 X 4.5 CON TW8	652	IVE
2	EA	ELEC PANIC HARDWARE	RX-9847-L-LBR-E996-17-FSE-CON (FAIL SECURE) LENGTH & HEIGHT AS REQ	626	VON
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	SFIC RIM CYLINDER	80-159 W/CONST. CORE	626	SCH
2	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
2	EA	PROTECTION PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CCV	630	IVE
2	EA	SILENCER	SR64	GRY	IVE
2	EA	HARNESS (IN DOOR)	ALLEGION CONNECT TYPE & LENGTH AS REQ		SCH
2	EA	HARNESS (TO POWER SUPPLY)	CON-6P (CONNECTION LEADS)		SCH
1	EA	CREDENTIAL READER	CREDENTIAL READER BY ANOTHER SECTION		
2	EA	DOOR CONTACT	679-05 TYPE AS REQ	WHT	SCE
1	EA	POWER SUPPLY	POWER SUPPLY FOR CARD READER BY ANOTHER SECTION		
1	EA	POWER SUPPLY	PS902	LGR	SCE

-INGRESS BY THE CARD READER OR KEY OVERRIDE.  
-EGRESS BY THE PUSH PADS.

**HARDWARE GROUP NO. C700C**

<b><u>QTY</u></b>		<b><u>DESCRIPTION</u></b>	<b><u>CATALOG NUMBER</u></b>	<b><u>FINISH</u></b>	<b><u>MFR</u></b>
4	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
2	EA	ELECTRIC HINGE	5BB1HW 4.5 X 4.5 CON TW8	652	IVE
2	EA	ELEC PANIC HARDWARE	RX-9847-L-LBR-E996-17-FSE-CON (FAIL SECURE) LENGTH & HEIGHT AS REQ	626	VON
1	EA	SFIC RIM CYLINDER	80-159 W/CONST. CORE	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
2	EA	SURFACE CLOSER	4040XP SCUSH X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
2	EA	PROTECTION PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	SILENCER	SR64	GRY	IVE
2	EA	HARNESS (TO POWER SUPPLY)	CON-6P (CONNECTION LEADS)		SCH
2	EA	HARNESS (IN DOOR)	ALLEGION CONNECT TYPE & LENGTH AS REQ		SCH
1	EA	CREDENTIAL READER	CREDENTIAL READER BY ANOTHER SECTION		
2	EA	DOOR CONTACT	679-05 TYPE AS REQ	WHT	SCE
1	EA	POWER SUPPLY	PS902	LGR	SCE
1	EA	POWER SUPPLY	POWER SUPPLY FOR CARD READER BY ANOTHER SECTION		

-INGRESS BY THE CARD READER OR KEY OVERRIDE.

-EGRESS BY THE PUSH PADS.

**HARDWARE GROUP NO. C701**

<b><u>QTY</u></b>		<b><u>DESCRIPTION</u></b>	<b><u>CATALOG NUMBER</u></b>	<b><u>FINISH</u></b>	<b><u>MFR</u></b>
2	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	ELECTRIC HINGE	5BB1HW 4.5 X 4.5 CON TW8	652	IVE
1	EA	ELEC PANIC HARDWARE	RX-98-L-E996-17-FSE-CON (FAIL SECURE) LENGTH AS REQ	626	VON
1	EA	SFIC RIM CYLINDER	80-159 W/CONST. CORE	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	HARNESS (IN DOOR)	ALLEGION CONNECT TYPE & LENGTH AS REQ		SCH
1	EA	HARNESS (TO POWER SUPPLY)	CON-6P (CONNECTION LEADS)		SCH
1	EA	CREDENTIAL READER	CREDENTIAL READER BY ANOTHER SECTION		
1	EA	DOOR CONTACT	679-05 TYPE AS REQ	WHT	SCE
1	EA	POWER SUPPLY	POWER SUPPLY FOR CARD READER BY ANOTHER SECTION		
1	EA	POWER SUPPLY	PS902	LGR	SCE

-INGRESS BY THE CARD READER OR KEY OVERRIDE.  
-EGRESS BY THE PUSH PAD.

**HARDWARE GROUP NO. C701W**

<b><u>QTY</u></b>		<b><u>DESCRIPTION</u></b>	<b><u>CATALOG NUMBER</u></b>	<b><u>FINISH</u></b>	<b><u>MFR</u></b>
2	EA	HINGE	5BB1HW 5 X 4.5	652	IVE
1	EA	ELECTRIC HINGE	5BB1HW 5 X 4.5 CON TW8	652	IVE
1	EA	ELEC PANIC HARDWARE	RX-98-L-E996-17-FSE-CON (FAIL SECURE) LENGTH AS REQ	626	VON
1	EA	SFIC RIM CYLINDER	80-159 W/CONST. CORE	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	HARNESS (TO POWER SUPPLY)	CON-6P (CONNECTION LEADS)		SCH
1	EA	HARNESS (IN DOOR)	ALLEGION CONNECT TYPE & LENGTH AS REQ		SCH
1	EA	CREDENTIAL READER	CREDENTIAL READER BY ANOTHER SECTION		
1	EA	DOOR CONTACT	679-05 TYPE AS REQ	WHT	SCE
1	EA	POWER SUPPLY	POWER SUPPLY FOR CARD READER BY ANOTHER SECTION		
1	EA	POWER SUPPLY	PS902	LGR	SCE

-INGRESS BY THE CARD READER OR KEY OVERRIDE.  
-EGRESS BY THE PUSH PAD.

**HARDWARE GROUP NO. C708**

<b><u>QTY</u></b>		<b><u>DESCRIPTION</u></b>	<b><u>CATALOG NUMBER</u></b>	<b><u>FINISH</u></b>	<b><u>MFR</u></b>
4	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
2	EA	ELECTRIC HINGE	5BB1HW 4.5 X 4.5 CON TW8	652	IVE
2	EA	ELEC PANIC HARDWARE	RX-9847-L-LBR-E996-17-FSE-CON (FAIL SECURE) LENGTH & HEIGHT AS REQ	626	VON
1	EA	SFIC RIM CYLINDER	80-159 W/CONST. CORE	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
2	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
2	EA	PROTECTION PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CCV	630	IVE
2	EA	FIRE/LIFE WALL MAG	SEM7800 SERIES AS REQUIRED	689	LCN
2	EA	SILENCER	SR64	GRY	IVE
2	EA	HARNESS (IN DOOR)	ALLEGION CONNECT TYPE & LENGTH AS REQ		SCH
2	EA	HARNESS (TO POWER SUPPLY)	CON-6P (CONNECTION LEADS)		SCH
1	EA	CREDENTIAL READER	CREDENTIAL READER BY ANOTHER SECTION		
2	EA	DOOR CONTACT	679-05 TYPE AS REQ	WHT	SCE
1	EA	POWER SUPPLY	PS902	LGR	SCE
1	EA	POWER SUPPLY	POWER SUPPLY FOR CARD READER BY ANOTHER SECTION		

-MAGNETICALLY HELD OPEN DURING CERTAIN HOURS  
-WHEN DOORS ARE CLOSED, INGRESS BY THE CARD READER OR KEY OVERRIDE.  
-FREE EGRESS BY THE PUSH PADS.  
-WIRE THE MAGNETIC HOLD OPENS TO THE FIRE ALARM SYSTEM.  
-THE MAGNETIC HOLD OPENS ARE TO RELEASE UPON ACTIVATION OF THE FIRE ALARMS  
SYSTEM.

**HARDWARE GROUP NO. C714A**

<b><u>QTY</u></b>		<b><u>DESCRIPTION</u></b>	<b><u>CATALOG NUMBER</u></b>	<b><u>FINISH</u></b>	<b><u>MFR</u></b>
2	EA	CONT. HINGE	112XY EPT HEIGHT AS REQ	628	IVE
2	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-3547A-NL-OP-CON LENGTH & HEIGHT AS REQ	626	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-3547A-EO-CON LENGTH & HEIGHT AS REQ	626	VON
1	EA	SFIC RIM CYLINDER	80-159 W/CONST. CORE	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
2	EA	90 DEG OFFSET PULL	8190-O 10"	630	IVE
2	EA	SURFACE CLOSER	4040XP SCUSH X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	SET	SEAL	PERIMETER SEAL BY FRAME MANUFACTURER		
1	SET	ASTRAGAL	MEETING STILE SEAL BY DOOR MANUFACTURER		
2	EA	DOOR SWEEP	8198AA LENGTH AS REQ	AA	ZER
1	EA	THRESHOLD	65A LENGTH AS REQ	A	ZER
2	EA	HARNESS (TO POWER SUPPLY)	CON-6P (CONNECTION LEADS)		SCH
2	EA	HARNESS (IN DOOR)	ALLEGION CONNECT TYPE & LENGTH AS REQ		SCH
1	EA	CREDENTIAL READER	CREDENTIAL READER BY ANOTHER SECTION		
2	EA	DOOR CONTACT	679-05 TYPE AS REQ	WHT	SCE
1	EA	POWER SUPPLY	PS902 900-2RS (COORDINATE POWER SUPPLIES WITH SECURITY PRIOR TO SUBMITTAL. OMIT WHERE PROVIDED BY SECURITY)		VON
1	EA	POWER SUPPLY	POWER SUPPLY FOR CARD READER BY ANOTHER SECTION		

-INGRESS BY THE CARD READER OR KEY OVERRIDE.

-EGRESS BY THE PUSH PADS.

**HARDWARE GROUP NO. C715**

<b><u>QTY</u></b>		<b><u>DESCRIPTION</u></b>	<b><u>CATALOG NUMBER</u></b>	<b><u>FINISH</u></b>	<b><u>MFR</u></b>
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-98-L-NL-CON LENGTH AS REQ.	626	VON
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	SFIC RIM CYLINDER	80-159 W/CONST. CORE	626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	RAIN DRIP	142A DW + 4"	AA	ZER
1	EA	GASKETING	328AA H & J	AA	ZER
1	EA	DOOR SWEEP	8198AA LENGTH AS REQ	AA	ZER
1	EA	THRESHOLD	65A LENGTH AS REQ	A	ZER
1	EA	HARNESS (IN DOOR)	ALLEGION CONNECT TYPE & LENGTH AS REQ		SCH
1	EA	HARNESS (TO POWER SUPPLY)	CON-6P (CONNECTION LEADS)		SCH
1	EA	CREDENTIAL READER	CREDENTIAL READER BY ANOTHER SECTION		
1	EA	DOOR CONTACT	679-05 TYPE AS REQ	WHT	SCE
1	EA	POWER SUPPLY	PS902 900-2RS (COORDINATE POWER SUPPLIES WITH SECURITY PRIOR TO SUBMITTAL. OMIT WHERE PROVIDED BY SECURITY)		VON
1	EA	POWER SUPPLY	POWER SUPPLY FOR CARD READER BY ANOTHER SECTION		

-INGRESS BY THE CARD READER OR KEY OVERRIDE.

-EGRESS BY THE PUSH PAD.

**HARDWARE GROUP NO. C741RW**

<b><u>QTY</u></b>		<b><u>DESCRIPTION</u></b>	<b><u>CATALOG NUMBER</u></b>	<b><u>FINISH</u></b>	<b><u>MFR</u></b>
2	EA	HINGE	5BB1HW 5 X 4.5	652	IVE
1	EA	ELECTRIC HINGE	5BB1HW 5 X 4.5 CON TW8	652	IVE
1	EA	ELEC FIRE EXIT HARDWARE	RX-98-L-F-E996-17-FS-CON (FAIL SAFE) LENGTH AS REQ	626	VON
1	EA	SFIC RIM CYLINDER	80-159 W/CONST. CORE	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKT, SPCR & PLATE AS REQ MOUNT THE CLOSER ON THE LEAST PUBLIC SIDE OF THE DOOR.	689	LCN
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	188S PSA H & J	BK	ZER
1	EA	HARNESS (TO POWER SUPPLY)	CON-6P (CONNECTION LEADS)		SCH
1	EA	HARNESS (IN DOOR)	ALLEGION CONNECT TYPE & LENGTH AS REQ		SCH
1	EA	CREDENTIAL READER	CREDENTIAL READER BY ANOTHER SECTION		
1	EA	DOOR CONTACT	679-05 TYPE AS REQ	WHT	SCE
1	EA	POWER SUPPLY	POWER SUPPLY FOR CARD READER BY ANOTHER SECTION		
1	EA	POWER SUPPLY	PS902 FA900 (COORDINATE POWER SUPPLIES WITH SECURITY PRIOR TO SUBMITTAL. OMIT WHERE PROVIDED BY SECURITY)	LGR	SCE

-INGRESS BY THE CARD READER OR KEY OVERRIDE.

-EGRESS BY THE PUSH PAD.

-WIRE THE ELECTRIFIED TRIM TO THE FIRE ALARM SYSTEM.

-THE ELECTRIFIED TRIM WILL BECOME FAIL SAFE UPON ACTIVATION OF THE FIRE ALARM SYSTEM.

**HARDWARE GROUP NO. CE200**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
5	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	ELECTRIC HINGE	5BB1 4.5 X 4.5 CON TW8	652	IVE
1	SET	AUTO FLUSH BOLT	FB31P/FB41P AS REQ	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	ND80HD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	ELECTRIC STRIKE (PAIR DOORS)	6223- FSE-CON (FAIL SECURE) VOLTAGE AS REQ	630	VON
1	EA	COORDINATOR	COR X FL X MB X HW PREPS X LENGTH AS REQUIRED	628	IVE
2	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
2	EA	PROTECTION PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	MEETING STILE	328AA (2 PCS - 1 SET) HEIGHT AS REQUIRED (OMIT @ NON-RATED DOORS)	AA	ZER
1	EA	GASKETING	188S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER
1	EA	HARNESS (IN DOOR)	ALLEGION CONNECT TYPE & LENGTH AS REQ		SCH
1	EA	HARNESS (TO POWER SUPPLY)	CON-6P (CONNECTION LEADS)		SCH
1	EA	CREDENTIAL READER	CREDENTIAL READER BY ANOTHER SECTION		
1	EA	MOTION SENSOR	SCANII	WHT	SCE
2	EA	DOOR CONTACT	679-05 TYPE AS REQ	WHT	SCE
1	EA	POWER SUPPLY	POWER SUPPLY FOR CARD READER BY ANOTHER SECTION		
1	EA	POWER SUPPLY	PS902 FA900 (COORDINATE POWER SUPPLIES WITH SECURITY PRIOR TO SUBMITTAL. OMIT WHERE PROVIDED BY SECURITY)	LGR	SCE

-INGRESS BY THE CARD READER OR KEY OVERRIDE.

-EGRESS BY THE LEVER.

-AT FIRE RATED DOORS, WIRE THE ELECTRIC STRIKE TO THE FIRE ALARM SYSTEM.

-AT FIRE RATED DOORS, THE ELECTRIC STRIKE WILL BECOME FAIL SECURE UPON  
ACTIVATION OF THE FIRE ALARM SYSTEM.

**HARDWARE GROUP NO. CE200S**

<b><u>QTY</u></b>		<b><u>DESCRIPTION</u></b>	<b><u>CATALOG NUMBER</u></b>	<b><u>FINISH</u></b>	<b><u>MFR</u></b>
5	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	ELECTRIC HINGE	5BB1 4.5 X 4.5 CON TW8	652	IVE
1	SET	AUTO FLUSH BOLT	FB31P/FB41P AS REQ	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	ND80HD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	ELECTRIC STRIKE (PAIR DOORS)	6223- FSE-CON (FAIL SECURE) VOLTAGE AS REQ	630	VON
1	EA	COORDINATOR	COR X FL X MB X HW PREPS X LENGTH AS REQUIRED	628	IVE
1	EA	OH STOP	100S SERIES X SIZE & MOUNTING AS REQ	630	GLY
2	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
2	EA	PROTECTION PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	MEETING STILE	328AA (2 PCS - 1 SET) HEIGHT AS REQUIRED (OMIT @ NON-RATED DOORS)	AA	ZER
1	EA	GASKETING	188S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER
1	EA	HARNESS (TO POWER SUPPLY)	CON-6P (CONNECTION LEADS)		SCH
1	EA	HARNESS (IN DOOR)	ALLEGION CONNECT TYPE & LENGTH AS REQ		SCH
1	EA	CREDENTIAL READER	CREDENTIAL READER BY ANOTHER SECTION		
1	EA	MOTION SENSOR	SCANII	WHT	SCE
2	EA	DOOR CONTACT	679-05 TYPE AS REQ	WHT	SCE
1	EA	POWER SUPPLY	POWER SUPPLY FOR CARD READER BY ANOTHER SECTION		
1	EA	POWER SUPPLY	PS902 FA900 (COORDINATE POWER SUPPLIES WITH SECURITY PRIOR TO SUBMITTAL. OMIT WHERE PROVIDED BY SECURITY)	LGR	SCE

-INGRESS BY THE CARD READER OR KEY OVERRIDE.

-EGRESS BY THE LEVER.

-AT FIRE RATED DOORS, WIRE THE ELECTRIC STRIKE TO THE FIRE ALARM SYSTEM.

-AT FIRE RATED DOORS, THE ELECTRIC STRIKE WILL BECOME FAIL SECURE UPON  
ACTIVATION OF THE FIRE ALARM SYSTEM.

**HARDWARE GROUP NO. CE201**

<b><u>QTY</u></b>		<b><u>DESCRIPTION</u></b>	<b><u>CATALOG NUMBER</u></b>	<b><u>FINISH</u></b>	<b><u>MFR</u></b>
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80HD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	ELECTRIC STRIKE (SGL DOOR - HMF)	6211-FSE-CON (FAIL SECURE) VOLTAGE AS REQ	630	VON
1	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	188S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER
1	EA	HARNESS (TO POWER SUPPLY)	CON-6P (CONNECTION LEADS)		SCH
1	EA	CREDENTIAL READER	CREDENTIAL READER BY ANOTHER SECTION		
1	EA	MOTION SENSOR	SCANII	WHT	SCE
1	EA	DOOR CONTACT	679-05 TYPE AS REQ	WHT	SCE
1	EA	POWER SUPPLY	PS902 FA900 (COORDINATE POWER SUPPLIES WITH SECURITY PRIOR TO SUBMITTAL. OMIT WHERE PROVIDED BY SECURITY)	LGR	SCE
1	EA	POWER SUPPLY	POWER SUPPLY FOR CARD READER BY ANOTHER SECTION		

-INGRESS BY THE CARD READER OR KEY OVERRIDE.

-EGRESS BY THE LEVER.

-AT FIRE RATED DOORS, WIRE THE ELECTRIC STRIKE TO THE FIRE ALARM SYSTEM.

-AT FIRE RATED DOORS, THE ELECTRIC STRIKE WILL BECOME FAIL SECURE UPON  
ACTIVATION OF THE FIRE ALARM SYSTEM.

**HARDWARE GROUP NO. CE201C**

<b><u>QTY</u></b>		<b><u>DESCRIPTION</u></b>	<b><u>CATALOG NUMBER</u></b>	<b><u>FINISH</u></b>	<b><u>MFR</u></b>
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80HD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	ELECTRIC STRIKE (SGL DOOR - HMF)	6211-FSE-CON (FAIL SECURE) VOLTAGE AS REQ	630	VON
1	EA	SURFACE CLOSER	4040XP SCUSH X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	188S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER
1	EA	HARNESS (TO POWER SUPPLY)	CON-6P (CONNECTION LEADS)		SCH
1	EA	CREDENTIAL READER	CREDENTIAL READER BY ANOTHER SECTION		
1	EA	MOTION SENSOR	SCANII	WHT	SCE
1	EA	DOOR CONTACT	679-05 TYPE AS REQ	WHT	SCE
1	EA	POWER SUPPLY	PS902 FA900 (COORDINATE POWER SUPPLIES WITH SECURITY PRIOR TO SUBMITTAL. OMIT WHERE PROVIDED BY SECURITY)	LGR	SCE
1	EA	POWER SUPPLY	POWER SUPPLY FOR CARD READER BY ANOTHER SECTION		

-INGRESS BY THE CARD READER OR KEY OVERRIDE.

-EGRESS BY THE LEVER.

-AT FIRE RATED DOORS, WIRE THE ELECTRIC STRIKE TO THE FIRE ALARM SYSTEM.

-AT FIRE RATED DOORS, THE ELECTRIC STRIKE WILL BECOME FAIL SECURE UPON  
ACTIVATION OF THE FIRE ALARM SYSTEM.

**HARDWARE GROUP NO. CE201W**

<b><u>QTY</u></b>		<b><u>DESCRIPTION</u></b>	<b><u>CATALOG NUMBER</u></b>	<b><u>FINISH</u></b>	<b><u>MFR</u></b>
3	EA	HINGE	5BB1HW 5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80HD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	ELECTRIC STRIKE (SGL DOOR - HMF)	6211-FSE-CON (FAIL SECURE) VOLTAGE AS REQ	630	VON
1	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	188S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER
1	EA	HARNESS (TO POWER SUPPLY)	CON-6P (CONNECTION LEADS)		SCH
1	EA	CREDENTIAL READER	CREDENTIAL READER BY ANOTHER SECTION		
1	EA	MOTION SENSOR	SCANII	WHT	SCE
1	EA	DOOR CONTACT	679-05 TYPE AS REQ	WHT	SCE
1	EA	POWER SUPPLY	POWER SUPPLY FOR CARD READER BY ANOTHER SECTION		
1	EA	POWER SUPPLY	PS902 FA900 (COORDINATE POWER SUPPLIES WITH SECURITY PRIOR TO SUBMITTAL. OMIT WHERE PROVIDED BY SECURITY)	LGR	SCE

-INGRESS BY THE CARD READER OR KEY OVERRIDE.

-EGRESS BY THE LEVER.

-AT FIRE RATED DOORS, WIRE THE ELECTRIC STRIKE TO THE FIRE ALARM SYSTEM.

-AT FIRE RATED DOORS, THE ELECTRIC STRIKE WILL BECOME FAIL SECURE UPON  
ACTIVATION OF THE FIRE ALARM SYSTEM.

**HARDWARE GROUP NO. CE206**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
5	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	ELECTRIC HINGE	5BB1 4.5 X 4.5 CON TW8	652	IVE
1	SET	AUTO FLUSH BOLT	FB31P/FB41P AS REQ	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	ND80HD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	ELECTRIC STRIKE (PAIR DOORS)	6223- FSE-CON (FAIL SECURE) VOLTAGE AS REQ	630	VON
1	EA	COORDINATOR	COR X FL X MB X HW PREPS X LENGTH AS REQUIRED	628	IVE
2	EA	OH STOP	100S SERIES X SIZE & MOUNTING AS REQ	630	GLY
2	EA	SURFACE CLOSER	4040XP RW/PA X MTG BRKT, SPCR & PLATE AS REQ	689	LCN
2	EA	PROTECTION PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	EA	MEETING STILE	328AA (2 PCS - 1 SET) HEIGHT AS REQUIRED (OMIT @ NON-RATED DOORS)	AA	ZER
1	EA	GASKETING	188S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER
1	EA	HARNESS (IN DOOR)	ALLEGION CONNECT TYPE & LENGTH AS REQ		SCH
1	EA	HARNESS (TO POWER SUPPLY)	CON-6P (CONNECTION LEADS)		SCH
1	EA	CREDENTIAL READER	CREDENTIAL READER BY ANOTHER SECTION		
1	EA	MOTION SENSOR	SCANII	WHT	SCE
2	EA	DOOR CONTACT	679-05 TYPE AS REQ	WHT	SCE
1	EA	POWER SUPPLY	PS902 FA900 (COORDINATE POWER SUPPLIES WITH SECURITY PRIOR TO SUBMITTAL. OMIT WHERE PROVIDED BY SECURITY)	LGR	SCE
1	EA	POWER SUPPLY	POWER SUPPLY FOR CARD READER BY ANOTHER SECTION		

-INGRESS BY THE CARD READER OR KEY OVERRIDE.

-EGRESS BY THE LEVER.

-AT FIRE RATED DOORS, WIRE THE ELECTRIC STRIKE TO THE FIRE ALARM SYSTEM.

-AT FIRE RATED DOORS, THE ELECTRIC STRIKE WILL BECOME FAIL SECURE UPON  
ACTIVATION OF THE FIRE ALARM SYSTEM.

**HARDWARE GROUP NO. CE214**

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
5	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	ELECTRIC HINGE	5BB1HW 4.5 X 4.5 CON TW8	630	IVE
2	EA	MANUAL FLUSH BOLT	FB458-12"	626	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	ND80HD RHO	626	SCH
1	EA	SFIC EVEREST CORE	80-037	626	SCH
1	EA	ELECTRIC STRIKE (PAIR DOORS)	6223- FSE-CON (FAIL SECURE) VOLTAGE AS REQ	630	VON
1	EA	OH STOP	900S SERIES X SIZE & MOUNTING AS REQ (INACTIVE LEAF)	630	GLY
1	EA	SURFACE CLOSER	4040XP SCUSH X MTG BRKT, SPCR & PLATE AS REQ (ACTIVE LEAF)	689	LCN
2	EA	PROTECTION PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	EA	RAIN DRIP	142A DW + 4"	AA	ZER
1	EA	MEETING STILE	328AA (2 PCS - 1 SET) HEIGHT AS REQUIRED	AA	ZER
1	EA	GASKETING	328AA H & J	AA	ZER
2	EA	DOOR SWEEP	8198AA LENGTH AS REQ	AA	ZER
1	EA	THRESHOLD	65A LENGTH AS REQ	A	ZER
1	EA	GASKETING	188S PSA HEIGHT AS REQ (MOUNT ON ASTRAGAL)	BK	ZER
1	EA	HARNESS (TO POWER SUPPLY)	CON-6P (CONNECTION LEADS)		SCH
1	EA	HARNESS (IN DOOR)	ALLEGION CONNECT TYPE & LENGTH AS REQ		SCH
1	EA	CREDENTIAL READER	CREDENTIAL READER BY ANOTHER SECTION		
2	EA	DOOR CONTACT	679-05 TYPE AS REQ	WHT	SCE
1	EA	POWER SUPPLY	POWER SUPPLY FOR CARD READER BY ANOTHER SECTION		
1	EA	POWER SUPPLY	PS902	LGR	SCE

-INGRESS BY THE CARD READER OR KEY OVERRIDE.  
-EGRESS BY THE LEVER.

**END OF SECTION**



## **SECTION 08 7122**

### **AUTOMATIC DOOR OPERATORS FOR THE DISABLED**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Automatic door operators for swinging doors and supplementary items necessary for installation for the following:
  - 1. Power-Assist Door Operators: For exterior and interior swinging doors for use by the disabled.
- B. Related Section:
  - 1. Division 08 Section "Automatic Entrances" for swinging doors and frames packaged with automatic door operators.
  - 2. Division 08 Section "Interior Automatic Door Operators for Staff Use" for low-energy door operators for interior prefinished flush wood swinging doors used primarily for staff on a continuous use.

##### **1.2 DEFINITIONS**

- A. AAADM: American Association of Automatic Door Manufacturers.
- B. Activation Device: A control that, when actuated, sends an electrical signal to the door operator to open the door.
- C. For automatic door terminology, see BHMA A156.19 for definitions of terms.

##### **1.3 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, including activation devices and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.
  - 1. Indicate required clearances, method of field assembly, components, and location and size of each field connection.
  - 2. Include locations and elevations of entrances showing activation and safety devices.
  - 3. Wiring Diagrams: For power, signal, and activation- and safety-device wiring.
  - 4. Include plans, elevations, sections, details, and attachments to other work for guide rails.
- C. Samples: For each exposed product and for each color and texture specified, manufacturer's standard in size.

#### **1.4 INFORMATIONAL SUBMITTALS**

- A. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.
- B. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
- C. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
- D. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".
- E. Warranty: Sample of warranty.
  - 1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

#### **1.5 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For automatic door operators, including activation and safety devices, to include in maintenance manuals.

#### **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Installer Qualifications:
  - 1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  - 2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
  - 3. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.
- C. Certified Inspector Qualifications: Certified by the AAADM.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency, and marked for intended location and application.
- E. Exit-Door Requirements: Comply with requirements of authorities having jurisdiction for doors with automatic door operators serving as a component of a required means of egress.

## **1.7 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

## **1.8 PROJECT CONDITIONS**

- A. Field Measurements: Verify actual dimensions of door frames by field measurements before fabrication of exposed covers for automatic door operators.

## **1.9 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.
- B. Templates: Obtain and distribute, to the parties involved, templates for doors, frames, operators, and other work specified to be factory prepared and reinforced for installing automatic door operators. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing automatic door operators to comply with indicated requirements.
- C. Electrical System Roughing-in: Coordinate layout and installation of automatic door operators with connections to power supplies and, where indicated, access-control system.

## **1.10 WARRANTY**

- A. Manufacturer's Warranty: Furnish manufacturer's written material and labor warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design of product. "Defects" are defined to include but not limited to deterioration or failure to perform as required.
  - 1. Failures include, but are not limited to, the following:
    - a. Faulty or sporadic operation of automatic door operator, including activation and safety devices.
    - b. Deterioration of metals, metal finishes, and other materials beyond normal use.
  - 2. Warranty Period: Two years from date of Substantial Completion.

## **1.11 MAINTENANCE SERVICE**

- A. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance by skilled employees of automatic door operator Installer. Include quarterly planned and preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door operation. Provide parts and supplies the same as those used in the manufacture and installation of original equipment.
  - 1. Engage a certified inspector to perform safety inspection after each adjustment or repair, and at end of maintenance period. Furnish completed inspection reports to Owner.
  - 2. Perform maintenance, including emergency callback service, during normal working hours.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
- B. Available Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those listed.
  - 1. Besam, Div of ASSA ABLOY Entrance Systems; SW200 Series.
  - 2. LCN Closers; Div of Allegion plc (formerly Ingersoll-Rand); 4640 Series.
  - 3. record USA; 6100 Series
  - 4. Stanley Access Technologies, LLC; Magic-Force Series.
- C. Source Limitations: Obtain automatic door operators, including activation devices, from single source from single manufacturer.

### **2.2 MATERIALS**

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with standards indicated below:
  - 1. Sheet: ASTM B 209 (ASTM B 209M).
  - 2. Extrusions: ASTM B 221 (ASTM B 221M).
- B. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, non-bleeding fasteners and accessories compatible with adjacent materials.

### **2.3 AUTOMATIC DOOR OPERATORS, GENERAL**

- A. General: Provide operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated; and complying with UL 325. Coordinate operator mechanisms with door operation, hinges, and activation and safety devices.
  - 1. Fire-Rated Doors: Where indicated, provide door operators for fire-rated door assemblies that comply with NFPA 80 for fire-rated door components and are listed and labeled by a qualified testing agency.
  - 2. Wind Load: At exterior doors, provide door operators that will open and close doors and maintain them in fully closed position when subjected to wind load as indicated on Drawings.
- B. Hinges: See Division 08 Section "Door Hardware" for type of hinge for each door that door operator shall accommodate.
- C. Cover for Surface-Mounted Operators: Fabricated from 0.125 in (3.2 mm) thick extruded or formed aluminum; manufacturer's standard width; with enclosed end caps, provision for maintenance access, and fasteners concealed when door is in closed position.

- D. Brackets and Reinforcements: Manufacturer's standard, fabricated from aluminum with nonstaining, nonferrous shims for aligning system components.
- E. Fire-Door Package: If indicated, provide fire-door package consisting of UL-listed latch mechanism, power-reset box, and caution signage for fire-rated doors. Latch mechanism shall allow door to swing free during automatic operation; when fire is detected, latch actuator shall cause exit hardware to latch when door closes. Provide latch actuators with fail-secure design.
- F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

## **2.4 POWER-ASSIST DOOR OPERATORS**

- A. Standard: BHMA A156.19.
- B. Performance Requirements:
  - 1. Opening Force:
    - a. Opening Force if Power Fails: Not more than 15 lbf (67 N) required to release latch if provided, not more than 30 lbf (133 N) required to manually set door in motion, and not more than 15 lbf (67 N) required to fully open door.
    - b. Accessible Interior Doors: Not more than 5 lbf (22 N) to push or pull door to fully open position.
  - 2. Entrapment-Prevention Force: Not more than 15 lbf (67 N) required for preventing stopped door from closing or opening.
- C. Configuration: Operator to control single or pair of swinging doors and as follows.
  - 1. Traffic Pattern: Two-way.
  - 2. Operator Mounting: Surface.
- D. Operation: Power-assisted opening that reduces the force to open door and power-assisted spring closing. Pushing or pulling on door activates operator. Provide time delay for door to remain open before initiating closing cycle as required by BHMA A156.19. When not in automatic mode, door operator shall function as manual door closer, with or without electrical power.
- E. Electromechanical Operating System: Self-contained unit powered by permanent-magnet dc motor; with closing speed controlled mechanically by gear train and dynamically by braking action of electric motor, connections for power and activation- and safety-device wiring, and manual operation including spring closing when power is off.
- F. Microprocessor Control Unit: Solid-state controller.
- G. Features:
  - 1. Adjustable opening and closing speed.
  - 2. Adjustable opening and closing force.
  - 3. Adjustable backcheck.
  - 4. Adjustable hold-open time from zero to 30 seconds.
  - 5. Adjustable time delay.

6. Adjustable acceleration.
7. Obstructions recycle.
8. On-off/hold-open switch to control electric power to operator; key operated.

H. Exposed Finish: As specified elsewhere in this specification section.

## **2.5 ACTIVATION DEVICES**

- A. General: Provide activation devices in accordance with BHMA standards, for condition of exposure and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated. Coordinate activation and safety devices with door operation and door operator mechanisms.
- B. Push-Plate Switch: Momentary-contact door control switch with flat push-plate actuator.
  1. Configuration: Square push plate with 4 by 4 in (100 by 100 mm) junction box.
    - a. Mounting: Recess-mounted, semi-flush in wall.
  2. Push-Plate Material: Stainless steel as selected by Architect from manufacturer's full range.
  3. Message: International symbol of accessibility and "Push to Open."
  4. Push-Plate Locations: Locate as indicated on drawings.
- C. Proximity Readers: Where indicated, provide wiring, contacts, and related materials to allow for operation of door operating system by owner-provided proximity reader.
- D. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.

## **2.6 FABRICATION**

- A. Factory-fabricate automatic door operators to comply with indicated standards.
- B. Fabricate exterior components to drain water passing joints and condensation and moisture occurring or migrating within operator enclosure to the exterior.
- C. Form aluminum shapes before finishing.
- D. Use concealed fasteners to greatest extent possible. Where exposed fasteners are required, use countersunk Phillips flat-head machine screws, finished to match operator.
- E. Provide metal cladding, completely cladding visible surfaces before shipment to Project site. Fabricate cladding with concealed fasteners and connection devices, with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion, and with allowance for thermal expansion at exterior doors.

## **2.7 ACCESSORIES**

- A. Signage: As required by cited BHMA standard for the type of operator.
  - 1. Application Process: Door manufacturer's standard process.
  - 2. Provide sign materials with instructions for field application when operators are installed.
  - 3. Signage with logo of manufacturer is not acceptable.

## **2.8 GENERAL FINISH REQUIREMENTS**

- A. Comply with NAAMM "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Apply organic and anodic finishes to formed-metal after fabrication unless otherwise indicated.
- D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## **2.9 ALUMINUM FINISHES**

- A. Door Operator Exposed Finish: Finish exposed components with finish matching door and frame specified in other specification sections and complying with appropriate requirement as follows:
  - 1. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.
  - 2. Color Anodic Finish: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.
  - 3. Baked-Enamel or Powder-Coat Finish: AAMA 2603. Comply with coating manufacturer's written instructions for cleaning, conversion coating, application, and baking.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.
- B. Examine roughing-in for electrical systems to verify actual locations of power connections before automatic door operator installation.
- C. Verify that full-height finger guards are installed at each door with pivot hinges where door has a clearance at hinge side greater than 1/4 in (6 mm) and less than 3/4 in (19 mm) with door in any position.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.
- C. General: Install complete automatic door operators according to manufacturer's written instructions, including activation and safety devices, control wiring, and remote power units if any; connection to the building's power supply; and signage.
  - 1. Do not install damaged components. Fit joints to produce hairline joints free of burrs and distortion.
  - 2. Install operators true in alignment with established lines and door geometry without warp or rack. Anchor securely in place.
  - 3. Low-Energy Door Operator Installation Standard: BHMA A156.19.
- D. Power Connection: See Division 26 Sections for connection to electrical power distribution system.
- E. Activation Devices: Install devices and wiring according to manufacturer's written instructions and cited BHMA standard for type of operator and direction of pedestrian travel. Connect activation-device wiring according to Division 26 low-voltage Section.
- F. Signage: Apply on both sides of each door as required by cited BHMA standard for type of door operator and direction of pedestrian travel.

### **3.3 FIELD QUALITY CONTROL**

- A. Certified Inspector: Engage a Certified Inspector to test and inspect components, assemblies, and installations, including connections.
- B. Perform the following tests and inspections:
  - 1. Test and inspect each automatic door operator installation, using AAADM inspection forms, to determine compliance of installed systems with applicable BHMA standards.
- C. Automatic door operators will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

### **3.4 ADJUSTING**

- A. Adjust automatic door operators to function smoothly, and lubricate as recommended by manufacturer; comply with requirements of applicable BHMA standards.
- B. After completing installation of exposed, factory-finished automatic door operators, inspect exposed finishes on doors and operators. Repair damaged finish to match original finish.

- C. Readjust automatic door operators after repeated operation of completed installation equivalent to three days' use by normal traffic (100 to 300 cycles).
- D. Occupancy Adjustment: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

### **3.5 DEMONSTRATION**

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

**END OF SECTION**

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Cherokee Nation  
Childers Architect  
2019-07-26**

**AUTOMATIC DOOR OPERATORS  
FOR THE DISABLED**

**08 7122 - 10**

## **SECTION 08 8000**

### **GLAZING**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Glass, glazing, and supplementary items necessary for installation; including glass specified in other Sections where glazing requirements are specified by reference to this Section.
- B. Quality Standards - Alternate: Include alternate to provide enhanced Quality Standards for glass fabrication.
  - 1. The Contract Documents require compliance with manufacturer/fabricator's enhanced quality standards. The emphasis of these quality standards is architectural glass that is manufactured and fabricated to standards requiring high-quality materials, fabrication and skillful workmanship to meet the aesthetic requirements of the Project.

##### **1.2 DEFINITIONS**

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. Interspace: Space between lites of an insulating-glass unit.
- D. Deterioration of Coated Glass: Defects developed from normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.
- E. Deterioration of Insulating Glass Units: Failure of the hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

### **1.3 DELEGATED ENGINEERING REQUIREMENTS**

- A. Contract Documents Design Intent: Drawings and Specifications indicate design intent for products and systems and do not necessarily indicate or specify total Work required. Contract Documents shall not be construed as an engineered design; furnish and install all Work required for a complete installation.
- B. Project Glazing Analysis: Prepared by manufacturer for primary glass or fabricator for fabricated glass units. Analyze each glass type and glazing condition for thermal, wind, impact and additional design loads indicated in glass performance requirements.
  - 1. Provide glass products in the thickness and strengths required to meet or exceed the criteria based on project loads and in-service conditions.
- C. Delegated Engineering – Structural Glass and Other Applications Exceeding Project Glazing Analysis: Contractor shall employ a qualified professional engineer to provide engineering for products and systems including attachment to building structure required to meet design intent of Contract Documents.
  - 1. Preparation of structural analysis data including engineering calculations, shop drawings and other submittals signed and sealed by the qualified professional engineer.
- D. Delegated Engineering Professional Qualifications: Professional engineer legally authorized to practice in jurisdiction where Project is located and experienced in providing engineering services of kind indicated for products and systems similar to this Project and has a record of successful in-service performance.
- E. Coordination of Work:
  - 1. Product Variations: In the event of minor differences between products and systems of acceptable or available manufacturers, Contractor shall notify Architect of such differences and resolve conflicts in a timely manner. Failure of Contractor to provide notification shall be construed as acceptance of conditions indicated, and changes caused by minor differences between products and Contract Documents shall be included in the Work at no additional cost to Owner.
  - 2. Allowable Adjustments: Minor dimension and profile adjustments may be made in interest of fabrication or erection methods or techniques or ability to satisfy design intent, provided design intent is maintained as determined by Architect. Proposed deviations shall include a detailed analysis of impact to adjacent substrates or other building systems, including related design or construction cost impacts. If accepted by Architect, deviations causing changes in materials, constructability, substrates, or conditions shall be included in the Work at no additional cost to Owner.

### **1.4 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, installation instructions, and recommendations for maintenance.

- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work. Show details of each type of glazing in conjunction with the appropriate framing system; indicate type of glass, sizes, shapes, glazing material, and quantity. Include details indicating glazing thickness, bite on glass, glass edge clearance, and depth of rabbet.
- C. Samples for Verification Purposes: For each type of glass product and glazing material, in the form of 12 in (300 mm) square sample for glass (except clear) and of 12 in (300 mm) long samples for glazing materials.
- D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

## **1.5 INFORMATIONAL SUBMITTALS**

- A. Delegated Engineering Calculations: Informational submittal for products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation; test reports are not acceptable substitute for calculations.
- B. Manufacturer's Project Acceptance Documents: Certifications by the manufacturer that its products and systems are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.
  - 1. Certification attesting application and use of glass for effects of thermal loading under expected service temperature ranges has been reviewed, and specified maximum probabilities of breakage will not be exceeded.
  - 2. Certifications attesting performance for specified design wind load criteria, has been reviewed; furnish design factor, statistical probability of breakage and center deflection for the largest size of each thickness and type.
  - 3. Certifications attesting face pressure of heat-strengthened glass units falls within limits specified. Glass determined to be outside these limits shall be replaced at no cost to Owner.
  - 4. Insulated Glass Units: Certification from manufacturer of insulating glass edge sealant indicating that glass edge sealants were tested for compatibility with other glazing materials including sealants, glazing tape, gaskets, setting blocks, and edge blocks.
- C. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
  - 1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
- D. Preconstruction Test Reports: For insulating or laminated glass and elastomeric glazing sealants. Provide preconstruction adhesion and compatibility test report.
- E. Source Quality Control Reports for Quality Standards - Alternate: If requested, written reports documenting testing procedures and recorded measurements.
  - 1. Distortion Tolerance Measurements: For heat-treated glass 6mm or thicker.
  - 2. Insulating Glass Unit Fabrication and Testing Requirements: For insulating glass units.

3. Glass Color Measurements: For monolithic coated glass and insulating coated glass units.
- F. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".
- G. Qualification Data:
  1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
- H. Warranty: Sample of Warranty.
  1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

## **1.6 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: To include in maintenance manuals.

## **1.7 QUALITY ASSURANCE**

- A. Installer Qualifications:
  1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
  3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.
  4. Certification: Installer shall be certified under the National Glass Association's Certified Glass Installer Program.
- B. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
  1. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- C. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
  1. Acceptable Products: Complying with CSPC 16 CFR 1201, Category II.
  2. Products Not Permitted: Wired Glass.
- D. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F (250 deg C), and the fire-resistance rating in minutes.

- E. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

## **1.8 PRECONSTRUCTION TESTING**

- A. Preconstruction Adhesion and Compatibility Testing: Test each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
  - 1. Testing will not be required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
  - 2. Use ASTM C 1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
  - 3. Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
  - 4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
  - 5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.
- B. Testing and Field Constructed Mock Ups: Provide glass and glazing materials for mock ups.
- C. Coated Spandrel Glass: Following coating quality criteria shall apply when viewed from indicated distance.
  - 1. At distance of 16 ft (4.8 m) or more under natural light conditions, color and reflectance may vary slightly when viewed against a dark, uniform background. Reflectance variations of plus or minus 1.5 percent are permissible.
  - 2. At distance of 16 ft (4.8 m) or more under natural light conditions, pinholes and scratches, where viewed in reflectance, are considered acceptable if not obvious.

## **1.9 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.
  - 1. Participants:
    - a. Architect.
    - b. Contractor, including superintendent.
    - c. Installer, including project manager and supervisor.
    - d. If requested, Manufacturer's qualified technical representative.
    - e. Installers of other construction interfaced with Work.
  - 2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
    - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
    - b. Review Contract Document requirements.
    - c. Review approved submittals.
    - d. Review inspection and testing requirements.

- e. Review environmental conditions and procedures for coping with unfavorable conditions.
  - f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
3. Record discussions, including decisions and agreements, and prepare report.

#### **1.10 DELIVERY, STORAGE, AND HANDLING**

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Insulating Glass Units: Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

#### **1.11 PROJECT CONDITIONS**

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
  - 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F (4.4 deg C).

#### **1.12 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

#### **1.13 WARRANTY**

- A. Manufacturer's Warranty: Furnish manufacturer's written material and labor warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design of product. "Defects" are defined to include but not limited to deterioration or failure to perform as required.
  - 1. Coated Glass: Manufacturer's standard but not less than 10 years after date of Substantial Completion.
  - 2. Insulating Glass Units:
    - a. Deterioration of Insulating Glass Units: Failure of the hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
    - b. Manufacturer's standard but not less than 10 years after date of Substantial Completion.

- B. Installer's Warranty: Furnish installer's written workmanship warranty signed by an authorized representative using installer's standard form agreeing to provide labor required to repair or replace work which exhibits workmanship defects. "Defects" is defined to include but not limited to deterioration or failure to perform as required.
  - 1. Warranty Period: Installer shall warrant the installation to be free from workmanship Defects for a period of 2 years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
- B. Glass Type Schedules:
  - 1. Exterior: As scheduled, or as indicated in Drawings
  - 2. Interior: As indicated on the drawings. Provide glazing panes 1/4 in (6 mm) thick unless noted otherwise.

### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

### **2.3 PERFORMANCE REQUIREMENTS**

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Design Loads: Glazing shall withstand design loads according to ASTM E 1300 including, but not limited to, gravity, wind, seismic, and erection design loads and thermal movements established by authorities having jurisdiction, applicable local building codes, and as indicated.
  - 1. Structural Movement: Glazing shall withstand movements of structure including, but not limited to, drift, twist, column shortening, long-term creep and deflection from uniformly distributed and concentrated live loads. Contractor shall obtain required design data and identify movements accommodated on submittal drawings.
    - a. System shall accommodate plus or minus 3/8 in (10 mm) differential vertical deflection of floors.
- C. Exterior Glazing:
  - 1. Design Wind Pressures: As indicated on Drawings.

2. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.
3. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically 15 degrees or less from vertical and under wind action for minimum of 60 seconds duration.
4. Probability of Breakage for Sloped Glazing: For glass surfaces sloped more than 15 degrees from vertical, design glass for a probability of breakage not greater than 0.001.
5. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/100 times the short-side length or 1 in (25mm), whichever is less.
6. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
7. Human Impact Loads: Locations indicated, and as defined by building code; glazed with safety glass.
8. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
  - a. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

D. Interior Glazing:

1. Maximum Lateral Deflection: For glass supported on all four edges or two edges, limit center-of-glass deflection to not more than 1/100 times the short-side length or 1/2 in (12 mm), whichever is less, at 10 lb/sq ft lateral load.
2. Differential Deflection: Where interior glazing is installed adjacent to a walking surface, the differential deflection of two adjacent unsupported edges shall not be greater than the thickness of the panels when a force of 50 lb/lin ft (730 N/m) is applied horizontally to one panel at any point up to 42 in (1050 mm) above the walking surface.
3. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
4. Human Impact Loads: Locations indicated, and as defined by building code; glazed with safety glass.

## 2.4 GLASS PRODUCTS, GENERAL

- A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
  1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
  2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.
- B. Strength: Provide Kind HS heat-treated float glass or Kind FT heat-treated float glass, unless otherwise indicated.
- C. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 1/4 in (6 mm) thick.
2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
3. U-Factors: Center-of-glazing values, according to NFRC 100, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
4. Solar Heat-Gain Coefficient and Visible Light Transmittance: Center-of-glazing values, according to NFRC 200.
5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

## 2.5 GLASS PRODUCTS

### A. Primary Float Glass Manufacturers:

1. AGC Glass Co. North America, Inc.
2. Guardian Industries Corporation
3. Pilkington North America, Inc.
4. PPG Industries, Inc.
5. Citadel Architectural products

### B. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.

### C. ) unless otherwise indicated; of kind and condition indicated.

1. Kind HS (heat strengthened) at exterior conditions and where recommended by manufacturer to comply with performance requirements.
2. Kind FT (fully tempered) where indicated, where recommended by manufacturer to comply with performance requirements or required for safety glazing.
3. Class 1 (clear) unless otherwise indicated.
4. Class 2 (tinted), where indicated.
5. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
6. For uncoated glass, comply with requirements for Condition A.
7. For coated vision glass, comply with requirements for Condition C (other coated glass).

### D. Ceramic-Coated Spandrel Glass: ASTM C 1048, Condition B, Type I, Quality-Q3, and with other requirements as specified.

## 2.6 INSULATING GLASS

### A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.

1. Sealing System: Dual seal, with polyisobutylene primary seal and silicone secondary seal in accordance with ASTM C 1249. Voids or skips in the primary seal are not allowed.
2. Spacer: Provide a hermetically sealed and dehydrated space; lites shall be separated by a spacer with three bent corners and one keyed-soldered corner or four bent corners and one straight butyl injected zinc plated steel straight key joint.

#### a. Spacer Material and Color:

- 1) Division 8 Section Glazed Aluminum Framing Systems: Aluminum with mill or clear anodic finish, unless otherwise indicated.

3. Desiccant: Molecular sieve or silica gel, or blend of both.

## 2.7 FIRE-PROTECTION-RATED GLAZING

- A. Fire-Protection-Rated Glazing, General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252 for door assemblies and NFPA 257 for window assemblies.
- B. Monolithic Ceramic Glazing: Clear, ceramic flat glass; 3/16 in (5 mm) nominal thickness.
  1. Manufacturers and Products:
    - a. Nippon Electric Glass Co., Ltd. (distributed by Technical Glass Products); FireLite
    - b. Safti First, a Division of O'Keefe's Inc.; SuperLite C/SP (for ratings up to 45-minute only)
    - c. Schott North America, Inc.; Pyran Star
    - d. Vetrotech Saint-Gobain; SGG Keralite FR-R
  2. Locations: Where indicated on drawings for 20, 45, 60, and 90 minute ratings where safety glazing is not required.
- C. Laminated Ceramic Glazing: Laminated glass made from 2 plies of clear, ceramic flat glass; 5/16-inch (8-mm) total nominal thickness; complying with testing requirements in 16 CFR 1201 for Category II materials.
  1. Manufacturers and Products:
    - a. Nippon Electric Glass Co., Ltd. (distributed by Technical Glass Products); FireLite Plus
    - b. Oldcastle Glass, Inc.; Pyroguard
    - c. Schott North America, Inc.; Pyran Star L
    - d. Vetrotech Saint-Gobain; SGG Keralite FR-L
  2. Locations: Where indicated on drawings for 20, 45, 60, 90, and 120 minute ratings where safety glazing is required.
- D. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:
  1. EPDM complying with ASTM C 864.
  2. Silicone complying with ASTM C 1115.
  3. Thermoplastic polyolefin rubber complying with ASTM C 1115.
- E. Soft Compression Gaskets: Extruded or molded closed-cell, integral-skinned gaskets of EPDM, silicone, or thermoplastic polyolefin rubber, complying with ASTM C 509, Type II, black, and of profile and hardness required to maintain watertight seal and compatible with sealants.
  1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

- F. Provide factory pre-molded, vulcanized or heat welded corners, for continuous, joint-free glazing material around sides of the glazing rabbet. Field-cut corners not allowed.
- G. Provide gasket slightly longer than opening to be filled, as recommended by gasket manufacturer.

## 2.8 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
  - 1. AAMA 806.3 tape is for high-performance commercial glazing applications involving continuous pressure from gaskets or pressure-generating stop designs. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.

## 2.9 ENGINEERED TRANSITION ASSEMBLIES

- A. Engineered Transition Assembly: Provide engineered transition assembly to seal air barrier perimeter to windows, doors and glazed aluminum framing systems.
  - 1. Basis of Design: Tremco, Inc; Proglaze Engineered Transition Assembly (ETA).
- B. Pre-Engineered Aluminum and Silicone Materials: Mechanically attach system assembly to glazed aluminum framing systems and provide durable seal. Engineered transitions assembly includes the following components:
  - 1. Silicone Rubber Sheet (SRS): Extruded, 40 durometer, translucent silicone, with lock-in rubber dart.
  - 2. Silicone Rubber Corners (SRC): Pre-molded, 40 durometer, translucent silicone, with lock in rubber dart
  - 3. Silicone Sealants: Comply with ASTM C 920, single-component, neutral-curing silicone; Class 100/50, Grade NS, Use O.
    - a. Basis of Design: Tremco Inc.; Spectrem 1, or other approved sealant as recommended by manufacturer.
  - 4. Extruded Aluminum Attachment (EAA): Alodine finished, pre-engineered profile designed to receive silicone lock-in rubber dart. Pre-drilled extrusion with butyl tape, 100% solid **polyisobutylene-cross linked butyl preformed sealant**.

## 2.10 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

- D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
- G. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

## **2.11 FABRICATION OF GLAZING UNITS**

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
- B. Grind smooth and polish exposed glass edges and corners.

## **2.12 SOURCE QUALITY CONTROL - ALTERNATE**

- A. Inspections and Testing: Manufacturer/fabricator shall perform pre-construction source quality-control inspections and testing, including but not limited to the following.
  - 1. Basis of Design for Quality Standard: PPG Skyline Quality Standard or equivalent standard as recommended by glass manufacturer/fabricator and accepted by the Architect.
  - 2. Certification: Certifications by the manufacturer/fabricator that its products and systems comply with requirements and that products failing to meet requirements are not incorporated into the Work.
  - 3. Documentation: Inspection and testing records shall be maintained for a period of 10 years from the date of Substantial Completion. Provide inspection and testing records upon request and at no cost to Owner or Architect.
- B. Distortion Tolerance Measurement for Processing Heat-Treated Glass.
  - 1. On-Line Distortion Measurement System: Measure each piece of monolithic, uncoated or coated, heat-treated glass 6 mm or thicker.
    - a. Visual Mock Up Glass: Measurements for glass panels used in mock ups shall establish fabrication tolerances for the Project. Glass panels used in visual mock ups shall be fabricated to and representative of the same fabrication tolerances as glass panels used on the Project.
  - 2. Roll Wave and Milidiopter Maximum Distortion Tolerances: On-Line Measurement.
    - a. Roll Wave (Horizontal) Distortion Tolerances: Maximum 0.003 inch at center of panel; 0.008 inch at edges of panel. Measurements are from peak to valley.

- b. Millidiopter Measurements: 90% of surface area shall be within a maximum range of plus or minus 120 millidiopters overall.
  - c. Measurement Device: On-Line measurement system utilizing high resolution optics measured in diopters.
  - d. Exclusions: Silk screen, full coverage ceramic frit glass and glass panels 10 mm and thicker are excluded from this requirement.
- 3. Bow/Warp Distortion Tolerance (Concave/Convex): Off-Line Straight Edge Measurement.
  - a. Bow/Warp Distortion Tolerance: Limited to a maximum of 1/2 of tolerances indicated in ASTM C1048 or 1/32 in (0.8 mm) per lineal foot.
- C. Insulating Glass Unit Fabrication and Testing Requirements.
  - 1. Primary Seal - Sealant Adhesion Testing: Manufacturer's recommended IGU adhesion pull testing process on units fabricated at the same time of production and on the same production line using the same processing equipment for the production of this Project. Conduct testing each shift or carton change on units not less than 24 in (600 mm) x 24 in (600 mm).
    - a. Adhesion Criteria: Comply with pass/fail requirements of manufacturer's published guidelines and/or manufacturer's certification requirements.
  - 2. Desiccant Temperature Rise Testing:
    - a. Criteria: Comply with desiccant manufacturer's written recommendations.
  - 3. Bow/Warp Unit Distortion Tolerance (Concave/Convex): Off-Line Straight Edge Measurement.
    - a. Bow/Warp Unit Distortion Tolerance: Limited to a maximum of 1/2 of tolerances indicated in ASTM C1048 or 1/32 in (0.8 mm) per lineal foot.
    - b. Air Space Gap Measurement: Visually inspect all units and measure center air space gap on all finished units over 35 square feet.
      - 1) Air Space Gap Tolerance: Maximum plus or minus 1/16 in (1.5 mm) at time of fabrication.
  - 4. Coating Edge Deletion: Clean, straight and precise.
    - a. Coating Edge Deletion Tolerance: Uniformly remove coating to the greater of 3/8 in (10 mm) from the glass edge or between centerline of the spacer and top of primary seal.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.
- B. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
  - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
  - 2. Presence and functioning of weep systems.
  - 3. Minimum required face and edge clearances.
  - 4. Effective sealing between joints of glass-framing members.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer's written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
- B. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- C. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

### **3.4 GLAZING, GENERAL**

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 in (1270 mm).
  - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
  - 2. Provide 1/8 in (3 mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- L. One-Way Observation Mirrored Glazing: Install with reflective surface facing the brightly lit subject-side.

### **3.5 TAPE GLAZING**

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

### **3.6 GASKET GLAZING (DRY)**

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

### **3.7 FIELD QUALITY CONTROL**

- A. Testing Agency: Owner may employ and pay for qualified independent testing agency to perform field quality control test in accordance with Division 01 Section "Field Test for Water Leakage". Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense.

### **3.8 CLEANING AND PROTECTION**

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

- E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

**3.9 GLASS TYPE SCHEDULE:** Refer to Exterior Elevation Drawings.

**END OF SECTION**



**SECTION 08 8816**  
**BETWEEN GLASS BLINDS UNITS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Work required for this section includes aluminum-framed between glass blind unit glazed into metal framing system (hollow metal or aluminum as indicated on drawings) and supplementary items necessary to complete its installation.

**1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.
- C. Samples for Initial Selection: For each type and color of louver slat indicated.
  - 1. Include similar samples of accessories involving color selection.
- D. Samples for Verification: For the following products, prepared on Samples from the same material to be used for the Work.
  - 1. Louver Slat: Not less than 12 in (300 mm) long.

**1.3 INFORMATIONAL SUBMITTALS**

- A. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
- B. Window Treatment Schedule: Include between glass blinds in schedule using same room designations indicated on Drawings.

**1.4 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For between glass blinds to include in maintenance manuals. Include the following:
  - 1. Methods for maintaining between glass blinds and finishes.
  - 2. Operating hardware.

## **1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.
  - 1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.
    - a. Show typical components, attachments to building structure, and requirements of installation.
  - 2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
  - 3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
  - 4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
  - 5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

## **1.6 PROJECT CONDITIONS**

- A. Environmental Limitations: Do not install blinds until construction and wet and dirty finish work in spaces, including painting, is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

## **1.7 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **1.8 WARRANTY**

- A. Manufacturer's Warranty: Furnish manufacturer's written material and labor warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design and installation of product. "Defects" is defined to include but not limited to deterioration or failure to perform as required.
  - 1. Warranty Period: Manufacturer shall warrant the products to be free from material and labor Defects for a period of 5 years from date of Substantial Completion

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Available Manufacturers/Fabricators and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, manufacturers/fabricators offering products that may be incorporated into the Work include, but are not limited to, those listed.

1. Unicel Architectural; Viulite, Model SL20P (Tilt Only, Dual Operator).

### **2.2 MATERIALS**

- A. Clear Tempered Glass: ASTM C1048, Type 1 transparent flat, Class 1 clear, Quality q3 glazing select, Kind FT fully tempered.
- B. Louvers: Manufacturer's standard aluminum mini-blinds, 1/8 in (3 mm) wide by 0.008 in (0.2 mm) thick with crowned profile. Head and bottom rails same color as slats. Side rails to support head rail and provide spacing between blind and inside surface of glass.

1. Color: As selected from manufacturer's standard colors.

### **2.3 FABRICATION**

- A. Integral Louver Blinds Unit: 1 in (25 mm) thick insulated glass unit consisting of two 1/8 in (3 mm) tempered glass lites sandwiched with mini-blinds in air space; blinds to be tilted via external ADA-compliant device both sides of door (unless indicated otherwise) having a force to tilt blinds of less than 2.25 lbf (10 N).
- B. Sealed Insulating Glass Units: Comply with ASTM E774.
1. Sealing System: Seal with manufacturer's standard sealant.
  2. Spacer: Manufacturer's standard spacer material and construction.
  3. Desiccant: Molecular sieve or silica gel, or blend of both.
- C. Operating Mechanism: Manufacturer's standard operating mechanism for operating blinds (tilt only) from either side of unit; except at psychiatric units, ADA-compliant mounting height.
- D. Unit Configuration (Tempered Unit):
1. Outer Lite: 1/8 in (3 mm) thick clear tempered glass.
  2. Airspace: 3/4 in (19 mm).
  3. Inner Lite: 1/8 in (3 mm) thick clear tempered glass.
- E. Tolerances:
1. Space of approximately 1/8 in (3 mm) on each side between slats and spacer, for free movement of system and allowing thermal transmission of aluminum slats.
  2. Blind Width Tolerance: Plus zero; minus 1/16 in (1.5 mm).
  3. Blind Height Tolerance: Plus 3/8 in (9 mm); minus zero. Bottom rail engages pins in sidetrack with some slack and is slightly above lower spacer bar.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer/fabricator's written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.
- B. Preparation: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
- C. Remove protective film, clean glass, and verify operation of operating mechanism to produce optimum tilt operation for smooth slat rotation of blinds.
- D. Remove nonpermanent labels, and clean surfaces.

### **3.3 ADJUSTING, CLEANING, AND PROTECTION**

- A. Protect insulating glass blind system units from damage immediately after installation by attaching crossed streamers to framing held away from glazing unit. Do not apply markers to security glazing surfaces.
- B. Protect insulating glass blind system units from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with insulating glass blind system units, remove substances immediately as recommended in writing by insulating glass blind system manufacturer.
- C. Remove and replace insulating glass blind system units that are broken, chipped, cracked, or abraded or that are damaged from natural causes, accidents, or vandalism during construction period.
- D. Wash insulating glass blind system units on exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash insulating glass blind system units as recommended in writing by insulating glass blind system manufacturer.

**END OF SECTION**

## **SECTION 09 2400**

### **PORTLAND CEMENT PLASTERING**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Portland cement plastering and supplementary items necessary for installation for the following:
  - 1. Exterior Walls: Direct bond Portland cement plastering, with modified cement waterproofing base coat, over cementitious substrates.
  - 2. Exterior / Interior Walls: Portland cement plastering over metal lath.
  - 3. Exterior Soffits and Ceilings: Portland cement plastering over metal lath on suspended framing system.
  - 4. Accent Trim: Plaster system foam trim.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturers specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work.
  - 1. Show locations and installation of control and expansion joints; indicated on all project elevations.
- C. Samples for Initial Selection: For each type of Plaster Finish System indicated. Include Samples of accessories involving color selection.
- D. Samples for Verification Purposes: Submit samples for each item listed below of size and construction indicated. Where products involve normal color and texture variations, include sample sets showing the full range of variations expected.
  - 1. 18 in (450 mm) square layered sample consisting of each Portland Cement Plaster System layer; prepared on rigid backing.
  - 2. 12 in (300 mm) long sample of each metal trim accessory.
  - 3. 12 in (300 mm) long flashing with end dam.
  - 4. 12 in (300 mm) long sample of each foam trim profile.

##### **1.3 INFORMATIONAL SUBMITTALS**

- A. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.

1. Product Approvals: Submit Product Control Notice of Acceptance (NOA) issued by Miami-Dade County Building Code Compliance Office (BCCO) or other product approval acceptable to authorities having jurisdiction for systems used at exterior of building.
- B. Field Quality Control Reports: Written report of testing and inspection required by Field Quality Control.
- C. Exterior and Interior Plastering Work Plan: Submit written plan detailing methods, materials and equipment to be used to comply with weather requirements.
- D. List of Materials for Layered Mock-Up for Construction Quality Purposes:
  1. Product, material, and equipment names, model numbers, lot numbers, batch numbers, source of supply, and other information required to identify items used. Include mix proportions for plaster and source of aggregates.
  2. Receipt of list does not constitute approval of deviations from Contract Documents, unless such deviations are specifically accepted by Architect in writing.
- E. Qualification Data:
  1. For firms and persons specified in Quality Assurance to demonstrate their capabilities and experience. Include list of completed projects.

#### **1.4 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 10 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Installer Qualifications:
  1. Experience: Installer's personnel with not less than 10 years of experience in the successful performance of Work similar to scope of this Project.
  2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 10 years of experience installing products and systems similar to scope of this Project.
- C. Pre-Construction Testing: Owner may employ and pay an independent testing agency to perform pre-construction testing to establish compliance of proposed Work with specified requirements.
  1. General Requirements: Test plaster mixes for composition to establish standard for field testing specified under "Field Quality Control" Article.
  2. Test Method: ASTM C 780, Annex A4.
  3. Specimen Quantity: As recommended by Testing Agency for this project.
  4. Reports: Interpret test results and prepare certified reports.
- D. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.

1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.
    - a. Show typical components, attachments to building structure, and requirements of installation.
  2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
  3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
  4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
  5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.
- E. Layered Mock-Up for Construction Quality Purposes: In addition to the Mock-ups described above and prior to Pre-Installation Conference; build layered mock-ups for each type of plastering assembly specified to demonstrate qualities of materials and to verify Work construction execution quality with Contract Documents (not for aesthetic qualities), using specified materials:
1. Notify Architect 7 days in advance of the dates and times when mock-up will be installed.
  2. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.
    - a. Show typical components, attachments to building structure, and requirements of installation.
    - b. Clean exposed faces of mock-up prior to presentation to Architect.
  3. Obtain Architect's acceptance of mock-ups before starting installation of permanent Work for the Project. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor, submitted to Architect in writing, and accepted by Architect in writing.
  4. Protect accepted mock-ups from the elements with weather-resistant membrane.
  5. Maintain accepted mock-ups during construction in an undisturbed condition as a standard for review of the completed Work.
  6. Arrange installation of products and materials in layered fashion to allow observation into concealed areas of assembly; including the following:
    - a. Plastering in specified finish, including accents and design details.
    - b. Wall back-up, complete with steel studs, sheathing, building paper, and air and water barrier.
    - c. Wall back-up, complete with cementitious substrate and waterproofing.
    - d. Metal lath and accessories.
    - e. Head, jamb, and sill of window or door opening:
      - 1) Head shall include lintels, flashings, and accessories.
      - 2) Jambs shall include edge flashings.
      - 3) Sills shall include flashings.
  7. Acceptance of layered mock-ups is for following Work execution qualities:

- a. Application of modified cement waterproofing.
  - b. Installation and attachment of building paper and metal lath.
  - c. Application of Portland cement plaster.
  - d. Installation and attachment of accessories, including joinery.
  - e. Plastering uniformity and consistency.
  - f. Attachments of plaster system foam trim.
  - g. Other material and construction qualities as determined by Architect.
8. Demolish and remove mock-ups when directed by Architect.

## **1.5 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.
- 1. Participants:
    - a. Architect.
    - b. Contractor, including superintendent.
    - c. Installer, including project manager and supervisor.
    - d. If requested, Manufacturer's qualified technical representative.
    - e. Installers of other construction interfaced with Work.
  - 2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
    - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
    - b. Review Contract Document requirements.
    - c. Review approved submittals.
    - d. Review inspection and testing requirements.
    - e. Review environmental conditions and procedures for coping with unfavorable conditions.
    - f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
  - 3. Record discussions, including decisions and agreements, and prepare report.

## **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Delivery: Deliver products in original unopened packages or containers, fully identified with intact and legible labels.
- B. Storage: Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

## **1.7 PROJECT CONDITIONS**

- A. Comply with ASTM C 926.
- B. Exterior Plasterwork:

1. Apply and cure plaster to prevent plaster drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
    - a. Protect Work against uneven and excessive evaporation and from strong flows of dry air, both natural and artificial.
  2. Apply plaster when ambient temperature is greater than 40 deg F (4.4 deg C).
  3. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.
    - a. Provide heat and protection (temporary or permanent) as required to protect Work from freezing.
    - b. Distribute heat uniformly to prevent concentration of heat near sources; provide deflection or protective screens.
- C. Stain Prevention: Prevent soil from staining exposed plaster. Immediately remove soil from exposed plaster.
1. Protect base of walls from rain-splashed mud and plaster splatter.
  2. Protect sills, ledges, and projections from plaster droppings.
  3. Protect surfaces of window and door frames, and other adjacent with painted and integral finishes from plaster droppings.
  4. Turn scaffolding planks near work on edge at end of each day to prevent rain from splashing plaster droppings or dirt onto face of exposed plaster.
- D. Interior Plasterwork: Maintain room temperatures at greater than 40 deg F (4.4 deg C) for at least 48 hours before plaster application, and continuously during and after application.
1. Avoid conditions that result in plaster drying out during curing period. Distribute heat evenly; prevent concentrated or uneven heat on plaster.
  2. Ventilate building spaces as required to remove water in excess of that required for hydrating plaster in a manner that prevents drafts of air from contacting surfaces during plaster application and until plaster is dry.
- E. Factory-Prepared Finishes: Comply with manufacturer's written recommendations for environmental conditions for applying finishes.

## **1.8 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".

- B. Basis of Design (Product Standard): Contract Documents are based on products specified under each item below to establish a standard of quality. Other available manufacturers with products having equivalent characteristics may be considered, provided deviations are minor and does not change intent of Contract Documents as judged by Architect.

## **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

## **2.3 PERFORMANCE REQUIREMENTS**

- A. Windborne-Debris-Impact-Resistance Performance: Comply with impact resistance testing requirements for Wind Zone.

## **2.4 SUSPENDED FRAMING SYSTEM FOR SOFFITS AND CEILINGS**

- A. Material Quality Standard: Provide components of sizes indicated but not less than that required to comply with ASTM C 754 for conditions indicated.
- B. Protective Coating - Standard Applications: ASTM A 653 / A 653M, G60 (Z180) hot-dip galvanized coating.
- C. Protective Coating - High Moisture / Humidity (Coastal) Applications: ASTM A 653 / A 653M, G90 (Z275) hot-dip galvanized coating.
- D. Hanger Attachments to Concrete:
  - 1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching hanger wires and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by a qualified independent testing agency.
    - a. Cast-in-place anchor, designed for attachment to concrete.
    - b. Post-installed chemical anchor.
    - c. Post-installed expansion anchor.
  - 2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by a qualified independent testing agency.
  - 3. Manufacturers:
    - a. Construction Materials, Inc.
    - b. Heckman Building Products, Inc.
    - c. Hilti Corp.
    - d. ITW Ramset/Red Head.
    - e. Powers Fasteners.
    - f. Simpson Strong Tie Anchor Systems.

4. For post-tensioned concrete, anchors shall not exceed 1 in (25 mm) embedment. Obtain Structural Engineer's written approval for all proposed anchors in post-tensioned concrete prior to installation.

E. Wire:

1. Material Quality Standard: ASTM A 641 / A 641M, Class 1, zinc-coated, soft annealed, mild steel wire.
2. Tie Wire Minimum Size: Single 0.0625 in (16 gage) (1.6 mm) diameter strand, or double 0.0475 in (18 gage) (1.2 mm) diameter strands.
3. Hanger Wire Minimum Size: 0.1620 in (8 gage) (4.12 mm) diameter.

F. Channels: Cold-rolled steel, ASTM C 645, 0.0538 in (16 gage) (1.3 mm) minimum thickness of base metal (uncoated), and as follows:

1. Carrying Channels: 1-1/2 in (38 mm) deep by 1/2 in (12 mm) wide flanges; 414 lbs per 1000 ft (0.616 kg/m).
2. Furring Channels: 3/4 in (19 mm) deep by 1/2 in (12 mm) wide flanges; 277 lbs per 1000 ft (0.412 kg/m).

## 2.5 PLASTERING MATERIALS

A. Portland Cement:

1. Product Quality Standard: ASTM C 150, Type I; except Type III may be used for cold-weather construction.
2. Color: Natural gray color or white cement as required producing color required.
3. Manufacturers:
  - a. Lafarge North America.
  - b. Lehigh Cement Co.
  - c. Lone Star Industries, Inc.
  - d. Rinker Materials.
  - e. Royal White Cement.

B. Types of Cement Not Permitted: ASTM C 91 masonry cement and ASTM C 1329 mortar cement are not acceptable and shall not be used.

C. Hydrated Lime:

1. Product Quality Standard: ASTM C 206, Type S.
2. Manufacturers:
  - a. Graymont Dolime (OH) Inc.
  - b. Rockwell Lime Co.

D. Sand Aggregate: ASTM C 897.

E. Reinforcing Fiber: Alkaline-resistant glass or polypropylene, 1/2 in (12 mm) long, free of contaminants, manufactured for use in Portland cement plaster.

F. Water: Potable.

- G. Ready-Mixed Base Coat Plaster: Factory-proportioned and pre-blended Portland cement, lime, alkali-resistant fibers, sand and proprietary additives complying with ASTM C926 for use in scratch and brown coat applications. Components of pre-blended mixes are limited to the Plastering Materials and standards listed in this section.
1. Available Manufacturers and Products:
    - a. LaHabra, a brand of ParexLaHabra, Inc.; Fiber-47 Fastwall Scratch and Brown Fiber Reinforced Sanded.
    - b. Quikrete Companies; Scratch and Brown Coat Fiber Reinforced Stucco.
    - c. Spec Mix; Scratch and Brown Fiber Reinforced Stucco.
- H. Acrylic Admixture:
1. Description: Water-based, non-redisperable one-component acrylic polymer, resistant to ultraviolet light degradation.
  2. Available Manufacturers and Products:
    - a. BASF, MasterEmaco A 660 (Formerly Thoro; Acryl 60).
    - b. Euclid Co.; Akkro 7-T.
    - c. Larsen Products Corp.; Acrylic Admix-101.
    - d. Parex; Adacryl.
    - e. Mapei Corp.; Planicrete AC.
    - f. United States Gypsum Company (USG); Acri-Add 100 percent Acrylic Add-Mix Fortified.

## 2.6 FINISH SYSTEMS

- A. Textured Acrylic Coating Finish System:
1. Description: Water-based, high-build 100 percent acrylic, waterproof coating system formulated with acrylic emulsion, colorfast mineral pigments, fine aggregates, fillers, and other proprietary ingredients; for use over Portland cement plaster base coats. Include manufacturer's recommended primers and sealing topcoats for acrylic-based finishes.
  2. Available Manufacturers and Products:
    - a. BASF Building Systems; MasterProtect HB 400 (Formerly Thoro Thorocoat Tex).
    - b. Euclid Chemical Company; Tamms Tammscoat.
    - c. PPG Industries, Inc.; Perma-Crete Texture Finishings
    - d. Sherwin-Williams Company; UltraCrete Textured Masonry Topcoat.
    - e. Textured Coatings of America, Inc.; Tex-Cote 600 Textured Coating.
  3. Acrylic Primer: Manufacturer recommended acrylic primer.
  4. Basis of Design: BASF, MasterProtect HC 400 (Formerly Thoro; Thorocoat).
    - a. Color and Texture: Provide products equivalent to color, finish, appearance, texture, and quality of products scheduled or indicated in Design Selections.
  5. Related Section: Refer to Division 09 Section Textured Acrylic Coatings.
- B. Textured Acrylic Coating Finish System:

1. Description: Factory-mixed acrylic emulsion coating system formulated with colorfast pigments, fine aggregates, fillers, and other proprietary ingredients; for use over Portland cement plaster base coats. Include manufacturers recommended primers and sealing topcoats for acrylic-based finishes.
2. Available Manufacturers and Products:
  - a. Parex; DPR Finish.
  - b. Dryvit; DPR Finish.
  - c. Sto Corp.; Stolit Finish.
  - d. BASF; Acrylic Finish.
3. Acrylic Primer: Manufacturer recommended acrylic primer. Application of primer is required.

C. Ready-Mixed Integrally-Colored Cement Plaster Finish Coat:

1. Description: Mill-mixed Portland cement, aggregates, coloring agents, and proprietary ingredients.
2. Basis of Design Color and Texture Selection: Provide products equivalent to color, finish, appearance, texture, and quality of products as scheduled or as indicated in Design Selections.
3. Manufacturers and Products:
  - a. California Stucco Products Corp.; Conventional Portland Cement Stucco.
  - b. El Rey Stucco Company, Inc., a brand of ParexLaHabra, Inc.; Premium Stucco Finish.
  - c. Florida Stucco; Florida Stucco.
  - d. LaHabra, a brand of ParexLaHabra, Inc.; Exterior Stucco Color Coat.
  - e. Omega Products International, Inc.; ColorTek Exterior Stucco.
  - f. Quikcrete; Quikcrete Finish Coat Stucco, No. 1201.
  - g. SonoWall, BASF Wall Systems, Inc.; Thoro Stucco.
  - h. United States Gypsum Company (USG); Oriental Exterior Finish Stucco.

D. Exterior Adhered Masonry Veneer: As specified in Division 04 Section Adhered Masonry Veneer.

## 2.7 EMBEDDED FLASHING MATERIALS

- A. Sheet Metal Flashing: Provide metal flashing, where flashing is exposed or partly exposed and where indicated, complying with SMACNA "Architectural Sheet Metal Manual" and as follows:
1. Material:
    - a. Product Quality Standard: ASTM A 240 / A 240M or A 666, Type 304.
    - b. Description: Stainless steel, 2D annealed finish, not less than 0.025 in (24 ga) (0.64 mm) thick, unless noted otherwise.
  2. Solder:
    - a. Product Quality Standard: ASTM B 32, Grade Sn60.
    - b. Description: Solder with acid flux of type recommended by stainless steel sheet manufacturer; use a noncorrosive rosin flux over tinned surfaces.

B. Rubberized Asphalt Flashing:

1. Description: Minimum 40 mils (1.0 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
2. Manufacturers and Products:
  - a. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
  - b. Grace Construction Products; Perm-A-Barrier Wall Flashing.
  - c. Henry Co., Blueskin TWF.
  - d. Polyguard Products, Inc.; 401 Membrane.
  - e. Tamko Building Products; TW-Thru Wall Flashing.
  - f. Williams Products, Inc.; Everlastic MF-40.

C. Sealant for Sheet Metal Flashing: Exterior non-sag silicone sealant as specified in Division 07 Section Joint Sealants.

**2.8 METAL ACCESSORIES**

A. General: The specifications for the accessories listed below are based upon the specified zinc alloy products as the design standards.

B. Casing Beads:

1. Product Description: Square edge, expanded metal flange; perforated with minimum 1/4 in (6 mm) diameter holes at 12 in (300 mm) on centers when used at bottom of plaster, non-perforated elsewhere; size required for plaster thickness.
2. Material Quality Standard: ASTM B 69, 99 percent pure zinc alloy.
3. Manufacturers and Products:
  - a. Alabama Metal Industries Corp. (AMICO); X-66 Casing Bead (Plaster Stop).
  - b. California Expanded Metal Co. (CEMCO); No. 66 Expanded Flange Casing Bead.
  - c. Clark Western; No. 66 Expanded Flange Casing Bead.
  - d. Dietrich Metal Framing; No. 66 Expanded Flange Casing Bead.
  - e. Niles Building Products Co.; No. 66-X Expanded Flange Casing Bead.

C. Outside Corner Reinforcement:

1. Product Description: Small nose corner beads, expanded metal flanges, with continuous stiffening ribs.
2. Material Quality Standard: ASTM B 69, 99 percent pure zinc alloy.
3. Manufacturers and Products:
  - a. AMICO (Alabama Metal Industries Corp.); X2 Cornerbead.
  - b. Clark Western; No. 2A Expanded Corner Bead.

D. Expansion Joint:

1. Product Description: Two-piece, slip joint that allows multi-directional movement; size required for plaster thickness.
2. Material Quality Standard: ASTM B 69, 99 percent pure zinc alloy.

3. Manufacturer and Product:
  - a. California Expanded Metal Co. (CEMCO); M-Slide Expansion Joint.

E. Control Joint:

1. Product Description: Back-to-back J-shape that permits positive locking with plaster, expanded metal lath flange; size required for plaster thickness.
2. Material Quality Standard: ASTM B 69, 99 percent pure zinc alloy.
3. Manufacturers and Products:
  - a. Alabama Metal Industries Corp. (AMICO); XJ15 Griplock Expansion Control Joint.
  - b. Clark Western; No. XJ15 Control Joint.
  - c. Dietrich Metal Framing; Zinc Control Joint.
  - d. Niles Building Products Co.; Double J Expansion Control Joint.
  - e. Western Metal Lath, Inc.; XJ15-3.

## **2.9 METAL LATH**

A. Metal Lath:

1. Product Quality Standard: ASTM C 847 with ASTM A 653 / A 653M, G60 (Z180), hot-dip galvanized zinc coating.
2. Description: Expanded, diamond mesh lath, 3.4 lb/sq yd (1.8 kg/sq m), of following types:
  - a. Self-furred (dimpled) over solid substrates.
  - b. Flat type suspended soffits and ceilings.
3. Manufacturers:
  - a. Alabama Metal Industries Corp. (AMICO); a Gibraltar Industries Company.
  - b. California Expanded Metal Co. (CEMCO).
  - c. Clark Western Building Systems.
  - d. Dietrich Metal Framing; a Worthington Industries Company.
  - e. Marino / WARE.
  - f. Niles Building Products Co.
  - g. Phillips Manufacturing Co.

B. Lath Tie Wire: ASTM A 641 / A 641M, Class 1 galvanized, not less than 0.0475 in (18 ga) (1.2 mm) diameter, soft temper.

C. Strip Lath Reinforcement:

1. Product Description: Strips of expanded metal lath, 4 in (100 mm) to 6 in (150 mm) wide, with smooth edges.
2. Material Quality Standard: Hot-dip galvanized steel, ASTM A 653 / A 653M, G60 (Z180) zinc coating.
3. Manufacturers and Products:
  - a. Alabama Metal Industries Corp. (AMICO); Striplath.
  - b. California Expanded Metal Co. (CEMCO); Stripite.

- c. Clark Western; Striplath.
- d. Dietrich Metal Framing; Strip Lath (LAST).

D. Inside Corner Reinforcement:

- 1. Product Description: Strips of galvanized expanded metal lath, minimum 3 in (75 mm) wide flanges, folded to 105 degrees, with smooth edges.
- 2. Material Quality Standard: Hot-dip galvanized steel, ASTM A 653 / A 653M, G60 (Z180) zinc coating.
- 3. Manufacturers and Products:
  - a. Alabama Metal Industries Corp. (AMICO); Cornalath.
  - b. California Expanded Metal Co. (CEMCO); Cornerite.
  - c. Clark Western; Cornerite.

## 2.10 FASTENERS

A. Screw Fasteners for Attaching Metal Lath to Sheathed Steel Studs:

- 1. Product Quality Standard: ASTM C 1063.
- 2. Description: Self-drilling and self-tapping screws with pan or wafer type head of size to engage 3 strands of lath; fabricated from corrosive resistant or nonferrous metal; in lengths required to achieve minimum penetration of 3/8 in (10 mm) beyond stud.

B. Powder Actuated Fasteners for Attaching Metal Lath to Cementitious Substrates:

- 1. Product Quality Standard: ANSI A10.3.
- 2. Product Description: Low velocity, powder actuated fasteners, stainless steel drive pins, length as required for minimum 3/4 in (19 mm) long penetration, with washers sized engage 3 strands of lath; powder loads suitable for application indicated; sufficient to correctly attach or anchor metal lath to substrate indicated without failure.
- 3. Manufacturers:
  - a. Hilti Corp.
  - b. ITW Ramset/Red Head.
  - c. Powers Fasteners.
  - d. Simpson Strong Tie Anchor Systems.

## 2.11 RELATED MATERIALS

A. Building Paper:

- 1. Product Quality Standard: Fed. Spec. UU-B-790a, Type 1, Style 2, Grade D.
- 2. Description: Asphalt-saturated heavy duty building paper.
- 3. Minimum Physical Properties and Performance Requirements:
  - a. Water Penetration Resistance: Minimum 30 minutes according to ASTM D 779.
  - b. Water Vapor Transmission: 14 perms according to ASTM E 96, Procedure A.

4. Manufacturer and Product: Fortifiber Corp.; Two Ply Jumbo Tex.
- B. Drainage Mat: Sto Drain Screen drainage mat.
  1. Description: Sto power wall drain Screen is a stucco wall assembly with continuous air and moisture barrier and advanced cavity wall design.
  2. Properties:
    - a. Nominal assembly thickness of 1", capable of achieving +65, -48 psf wind load resistance
    - b. Fire resistance of ASTM E 119 1 hour.

## **2.12 PLASTER MIXES AND COMPOSITIONS**

- A. Mix Quality Standard: ASTM C 926, Types as indicated.
- B. Mixing:
  1. General:
    - a. Size mixer to produce batches that will be applied within maximum 1-1/2 hours after mixing.
    - b. Accurately proportion materials for initial plaster mixture using measuring devices of known volume.
    - c. Use damp, loose sand.
    - d. Retempering of base coat mixes is permitted one time only after initial mixing. Plaster not used with 1-1/2 hours of initial mixing shall not be used.
    - e. Retempering of finish coat mixes is not permitted.
  2. Mechanical Mixing:
    - a. Mix each batch separately; double batching with single batch discharge is not permitted.
    - b. Maintain mixer in clean condition before, during, and after mix preparation. Remove partially set and hardened plaster from mixer drum before next batch.
    - c. Maintain mixer in continuous operation while charging mixer. Add water to bring mix to desired consistency. Continue mixing for 3 to 5 minutes after all ingredients have been added to mixer.
  3. Hand Mixing: Not permitted.
- C. General Job Mixed Base Coat Mix: Proportion materials for respective coats in parts by volume per sum of cementitious materials for aggregates to comply with following requirements for each method of application and plaster base indicated. Adjust mix proportions within limits specified to attain workability.
  1. Reinforcing Fiber Content: Add fiber to base-coat mixes after ingredients have mixed at least 2 minutes. Comply with fiber manufacturer's written instructions for fiber quantities in mixes, but do not exceed 1 lb of fiber per cu yd (0.6 kg of fiber per cu m) of cementitious materials.
  2. Acrylic Admixture: Proportion in accordance with manufacturers recommendations and used in place of mixing water.

D. Mixes for Direct Bond Plastering over Cementitious Substrate:

1. Waterproofing: Modified cement waterproofing as specified elsewhere in this Section.
2. Brown Coat:
  - a. 1 part Portland cement.
  - b. 3/4 to 1-1/2 parts lime.
  - c. 3 to 5 parts aggregate.
  - d. Reinforcing fibers.
  - e. Acrylic admixture.

E. Mixes for Plastering over Metal Lath:

1. Scratch Coat Mix:
  - a. 1 part Portland cement.
  - b. 0 to 3/4 parts lime.
  - c. 2-1/2 to 4 parts aggregate.
  - d. Reinforcing fibers.
  - e. Acrylic admixture.
2. Brown Coat Mix:
  - a. 1 part Portland cement.
  - b. 3/4 to 1-1/2 parts lime.
  - c. 3 to 5 parts aggregate, but not less than volume of aggregate used in scratch coat.
  - d. Reinforcing fibers.
  - e. Acrylic admixture.

F. Finish Coat: Textured acrylic coating finish system as specified elsewhere in this Section. Mix as required by manufacturer's written instructions.

G. Finish Coat: Elastomeric coating as specified in Division 09 Section Elastomeric Coatings.

H. Finish Coat: Integrally colored cement plaster finish. Mix as required by manufacturers written instructions.

I. No finish coat at adhered masonry veneer installations.

**2.13 METAL FLASHING FABRICATION**

A. Field Measurements: Where metal flashing is to fit, cope, or be tailored to other construction, check actual dimensions of other construction by accurate field measurements before fabrication.

B. Fabrication Procedures: Fabricate continuous flashings in sections 96 in (2400 mm) long minimum, but not exceeding 12 ft (3.6 m). Provide splice plates at joints of formed, smooth metal flashing.

1. Shop form flashing on a bending brake.
2. Shape, trim and hand seam on bench as far as practical with proper tools.

3. Form exposed metal Work without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated.
  4. Make angle bends and folds for interlocking metal with full regard for expansion and contraction to avoid buckling or fullness in metal after installation.
  5. Form materials to shape indicated with straight lines, sharp angles and smooth curves.
  6. Fold and hem exposed edges of flashings.
- C. Flashing Joinery: Fabricate interior and exterior corners, intersections, and complex flashing conditions in shop, rather than in field, with properly folded, constructed and continuous soldered joints. Field fabricated units are not permitted and will not be allowed.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to which Portland cement plastering will be applied for compliance with requirements, installation tolerances and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting Work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
1. Respective manufacturer's written installation instructions.
  2. Accepted submittals.
  3. Contract Documents.

### **3.3 PREPARATION**

- A. General: Comply with manufacturers instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
- B. Surface Conditioning: Immediately before plastering, dampen cementitious substrates that are indicated for direct application of plaster, except where a bonding agent has been applied. Determine and apply amount of moisture and degree of saturation that will result in optimum suction for plastering.
- C. Substrate Condition: Verify that gypsum sheathing and air and water barrier are properly installed.
- D. Steel Stud Framing: Locate and identify horizontal deflection tracks at top of wall framing.
- E. Cleaning: Remove form oils, coatings, laitance, efflorescence, mortar, loose material and substances that would adversely affect or reduce bonding.

- F. Temporary Grounds and Screeds: Install as necessary to ensure accurate rodding of plaster to true surfaces; coordinate with scratch-coat work.

### **3.4 INSTALLING FRAMING FOR SUSPENDED SOFFITS AND CEILINGS**

- A. General: Install framing level, plumb, square, or curved as required to receive Portland cement plastering.
- B. Hangers: Suspend hangers from building structural members and as follows:
  - 1. Install hangers plumb and free from contact with mechanical and electrical equipment, insulation or other objects within plenum. Within limitations allowed by installation quality standards, splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  - 2. Where width of ducts and other construction within plenum produces hanger spacings that interfere with location of hangers required to support framing, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support loads within performance limits established by installation quality standards.
  - 3. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.
  - 4. Secure rod, flat, or angle hangers to structure, including intermediate framing members, by attaching to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
- C. Carrying Channels: Space not over 36 in (900 mm) on centers with hanger wires located at 48 in (1200 mm) on centers and within 6 in (150 mm) of carrying channel ends.
- D. Furring Channels: Space furring channels not over 16 in (400 mm) on centers and wire tie to carrying channel at each crossing.
- E. Compression Strut to Resist Vertical Uplift: Install one carrying channel as a compression strut for every 30 sq ft (9 m), located between carrying channels and structure above. Secure wire tie to vertical members.
- F. Framed Openings: Frame openings in grillage with carrying channels supported on separate wire hangers and set frames for recessed items.
- G. Building Expansion Joints: Provide double carrying channels or furring channels side by side where expansion joints occur. Do not continue channels over or across building expansion joints.

### **3.5 INSTALLING BUILDING PAPER**

- A. Install building paper barrier over the face of air and water barrier:
  - 1. Delay installation until Portland cement plaster Work is to begin to minimize exposure of building paper.

2. Beginning at bottom of substrate wall, align horizontally; pull taut to eliminate fishmouths, wrinkles, buckles, and kinks; install in shingled manner to shed water without interception by exposed edges.
3. Offset building paper joints from sheet air and water barrier; lap horizontal joints 6 in (150 mm); lap vertical end joints 12 in (300 mm); stagger end laps; lap 12 in (300 mm) at inside and outside corners; lap flashing 6 in (150 mm).

### **3.6 INSTALLING METAL LATH**

#### **A. Installation of Metal Lath at Sheathed Steel Stud Walls covered with Building Paper and Air and Water Barrier:**

1. Install multiple sheets of metal lath to form continuous plane over substrates.
2. Layout and arrange so that metal lath joints will not occur over vertical and horizontal laps of previously installed weather resisting sheets.
3. Begin installation at bottom of substrate wall; install with long dimension at horizontal and stagger vertical end laps.
4. Lap horizontal sides not less than 1/2 in (12 mm), and securely tie between steel stud supports with lath tie wire at not more than 9 in (225 mm) on centers vertically.
5. Securely attach metal lath to each steel stud support with screw fasteners at not more than 7 in (175 mm) on centers vertically.
6. Lap vertical ends not less than 1 in (25 mm).
  - a. If lap occurs over a steel stud support, securely attach with screw fasteners at not more than 7 in (175 mm) on centers vertically.
  - b. If lap does not occur over a steel stud support, securely tie with lath tie wire at not more than 9 in (225 mm) on centers vertically.
7. Screw fasteners shall extend through not less than 3 strands of metal lath, weather resisting sheets, gypsum sheathing and into steel stud; tip of fastener shall extend beyond stud not less than 3/8 in (10 mm).
8. Do not extend metal lath behind or across control and expansion joints; attach each side of metal lath to separate joint accessory flange.
9. Do not attach metal lath to horizontal deflection track at top of wall framing.

#### **B. Installation of Metal Lath at Cementitious Substrates:**

1. Install multiple sheets of metal lath to form continuous plane over substrates.
2. Install with long dimension at horizontal and stagger vertical end laps.
3. Lap horizontal sides not more than 2 in (50 mm), and ensure horizontal edge of upper metal lath laps, or shingles, over lower metal lath.
4. Securely attach metal lath with powder actuated fasteners at following locations:
  - a. At each corner.
  - b. At midpoint of long side.
  - c. At not more than 16 in (400 mm) on centers horizontally and not more than 7 in (175 mm) on centers vertically.
5. Lap vertical ends not more than 2 in (50 mm).
6. Ensure there is lath-to-lath continuity.

#### **C. Installation of Metal Lath at Suspended Ceilings and Soffits:**

1. Install multiple sheets of metal lath to form continuous plane over suspended framing.
2. Install with long dimension perpendicular to furring channels and stagger end laps.
3. Lap sides and ends not less than 2 in (50 mm) and securely tie with lath tie wire at not more than 9 in (225 mm) on centers.
4. Securely attach at each carry channel with lath tie wire at not more than 6 in (150 mm) on centers.

### **3.7 INSTALLING EMBEDDED FLASHINGS**

- A. Design Intent: Drawings may not necessarily indicate or describe full extent of Work required for completion of embedded flashings.
- B. Reglets and Nailers: Install for flashing and other related construction where they are shown to be built into plaster.
- C. Preparation: Substrate surfaces shall be smooth and free from projections that could puncture flashing.
- D. Flashing Installation:
  1. Install true to line and levels indicated; minimize quantity of lap joints by using longest units possible.
  2. Set in proper locations with outside hemmed edges flush with building face location indicated; securely attach to substrate with same fasteners as used for attaching metal lath.
  3. Terminate ends of horizontal flashings with properly folded and constructed end dams with a depth of not less than 1 in (25 mm), with continuous soldered joints.
  4. At lap joints of horizontal flashings, form neat and aligned joints by interlocking splice plate within hemmed edge of sheet metal flashing profile; apply sealant and rubberized asphalt flashing as indicated to create water-resistant joint.
- E. Examination and Repair: Immediately prior to plastering Work, examine exposed surfaces of flashing and seal penetrations and damaged areas with rubberized asphalt flashing material before covering.

### **3.8 INSTALLING MODIFIED CEMENT WATERPROOFING for direct bond Plaster**

- A. Application:
  1. Apply number of coats recommended by manufacturer, but not less than two, by method suitable for substrate.
  2. Thickness of Modified Cement Waterproofing: Total cured nominal thickness of 1/16 in (1.5 mm).
  3. Allow sufficient time between coatings to eliminate possibility of cementitious substrate joints telegraphing.
  4. Texture final finish to provide keying for subsequent plaster.
  5. Allow sufficient time for curing before applying plaster.

### **3.9 INSTALLING ACCESSORIES**

- A. General Requirements:

1. Install at locations indicated according to installation quality standard.
  2. Attach securely with fasteners to hold accessories in place and alignment during plastering; secure at ends and not more than 12 in (300 mm) on centers.
  3. Install longest lengths possible, avoid butt joints.
  4. Install so that finished plaster surfaces will be true to line, level, plumb, square, curved or as otherwise required, without excessive thickness of plaster.
  5. Set vertical accessories plumb, and horizontal accessories level, and form true and neat corners.
  6. Vertical accessories shall pass through horizontal accessories.
  7. Miter or cope at corners; install with tight joints seated with sealant and in alignment.
  8. Bed accessories in sealant as indicated on Drawings.
- B. Casing Beads: Install continuous at edges and terminations of plaster. Use perforated beads at bottom of plaster areas and non-perforated at sides and top.
- C. Interior Corners: Install continuous inside corner reinforcement.
- D. Exterior Corners: Install continuous outside corner reinforcement.
- E. Corners of Openings: Install strip lath reinforcement diagonally.
- F. Base of Wall: Install foundation weep screed at dimension above grade indicated.
- G. Expansion and Control Joints:
1. Cementitious Substrates: As indicated on Drawings. If not indicated on drawings, then as required to align with joints in substrates behind or below plaster system.
  2. Metal Lath over Sheathing Substrates or at Soffits: As indicated on Drawings. If not indicated on drawings, then as follows:
    - a. Divide plaster into areas (panels) of following maximum sizes with length-to-width ratios of not greater than 2-1/2 to 1:
      - 1) Vertical Surfaces: 144 sq. ft. (13.4 sq. m).
      - 2) Horizontal Surfaces: 100 sq. ft. (9.3 sq. m).
    - b. Distances between control joints are not to be greater than 18 ft (5.4 m) on centers.
    - c. At door, window, and other openings, joints are to radiate vertically and horizontally from each corner.
  3. Metal Lath over Sheathing Substrates (at Adhered Masonry Veneer Installations): As indicated on Drawings. If not indicated on drawings, then as follows:
    - a. Distance between Control Joints: 1/2 in (12 mm) wide joints not more than 12 ft (3.6 m) on center each direction and a length-to-width ratio of 3 to 1.
      - 1) Vertical Surfaces: Not more than 144 sq. ft. (13.4 sq. m).
      - 2) Horizontal Surfaces: Not more than 100 sq. ft. (9.3 sq. m).

### **3.10 INSTALLING PORTLAND CEMENT PLASTER BASE COATS**

- A. General:

1. Apply plaster by hand or by pneumatic wet gun application method.
2. Establish and follow an application pattern that produces an even drying surface.
3. Avoid using materials that are frozen, caked, lumpy, dirty, or contaminated by foreign materials.
4. Avoid using excessive water in application of plaster materials.
5. Make internal corners and angles square; finish external corners flush with corner beads, square and true with plaster faces.

B. Plaster Base Coats at Direct Bond Locations:

1. Modified Cement Waterproofing: Apply to uniformly cover substrates.
2. Brown Coat: After modified cement waterproofing coat has cured, apply brown coat to uniform thickness with sufficient material and pressure to ensure tight, uniform bond.
3. Thickness of Plaster Base Coat:
  - a. Brown Coat: 3/8 in (10 mm) thick.

C. Plaster Base Coats at Metal Lath (Wall) Locations:

1. Scratch Coat:
  - a. Apply to uniform thickness indicated to completely embed metal lath.
  - b. Uniformly score surface approximately 1/8 in (3 mm) deep.
  - c. Moist cure each coat in accordance with ASTM C 926 before applying subsequent coatings.
2. Brown Coat:
  - a. After scratch coat has cured to be sufficient rigid, apply brown coat to uniform thickness indicated over damp scratch coat with sufficient material and pressure to ensure tight, uniform bond.
  - b. Rod to true, even plane, filling surface defects with plaster.
  - c. Uniformly float surface.
  - d. Moist cure each coat in accordance with ASTM C 926 before applying subsequent coatings.
3. Thickness of Plaster Base Coats:
  - a. Scratch Coat: 3/8 in (10 mm) thick.
  - b. Brown Coat: 3/8 in (10 mm) thick.

D. Plaster Base Coats at Metal Lath (Soffit) Locations:

1. Scratch Coat:
  - a. Apply to uniform thickness indicated to completely embed metal lath.
  - b. Uniformly score surface approximately 1/8 in (3 mm) deep.
  - c. Moist cure each coat in accordance with ASTM C 926 before applying subsequent coatings.
2. Brown Coat:

- a. After scratch coat has cured to be sufficient rigid, apply brown coat to uniform thickness indicated over damp scratch coat with sufficient material and pressure to ensure tight, uniform bond.
  - b. Rod to true, even plane, filling surface defects with plaster.
  - c. Uniformly float surface.
  - d. Moist cure each coat in accordance with ASTM C 926 before applying subsequent coatings.
- 3. Thickness of Plaster Base Coats:
  - a. Scratch Coat: 1/4 in (6 mm) thick.
  - b. Brown Coat: 1/4 in (6 mm) thick.
- E. Curing: Moist cure each coat in accordance with ASTM C 926 before applying subsequent coatings.
  - 1. Compensate ambient climatic conditions by providing sufficient moisture in plaster mix to permit continuous hydration of cementitious materials.
  - 2. Allow sufficient time between coats to permit curing and development of sufficient rigidity to resist cracking when subsequent coat is applied.
  - 3. Utilize any of following for curing:
    - a. Fog spray of water.
    - b. Vapor barrier over plastered area.
    - c. Barriers to deflect sunlight and wind.

### **3.11 INSTALLING FINISH COAT**

- A. Textured Acrylic Coating Finish Coat: Apply coating system, including primers, finish coats, and sealing topcoats, according to manufacturer's written instructions.
- B. Integrally-Colored Cement Plaster Finish Coat:
  - 1. Apply to 1/8 in (3 mm) thickness to provide finish complying with one of following:
    - a. PCA "Portland Cement Plaster/Stucco Manual", Fifth Edition: Fine sand float.
    - b. Technical Services Information Bureau (tsib.org): Fine sand float.
  - 2. Thickness: 1/8 in (3 mm).
  - 3. Curing: Cure with same criteria as specified for base coats.

### **3.12 PLASTERING SYSTEM THICKNESSES**

- A. Plastering at Direct Bond Locations:
  - 1. Total System Thickness: 5/8 in (15 mm) thick.
- B. Plastering at Metal Lath (Wall) Locations:
  - 1. Total System Thickness: 7/8 in (21 mm) thick.
- C. Plastering at Metal Lath (Soffit) Locations:

1. Total System Thickness: 5/8 in (15 mm) thick.

### **3.13 TOLERANCES**

- A. Finish Plane: Do not deviate more than plus or minus 1/8 in per 10 ft (3 mm per 3 m) from a true plane in finished plaster surfaces, as measured by a 10 ft (3 m) straightedge placed on surface.

### **3.14 FIELD QUALITY CONTROL**

- A. Testing Agency: The Owner may employ and pay a qualified independent testing agency to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense.

1. Testing: Testing agency will test and evaluate Work during construction.
2. Plaster Tests: Verify plaster composition with specified requirements according to ASTM C 780, Annex A4; made at following times during Work:
  - a. First day.
  - b. 5 percent.
  - c. 15 percent.
  - d. 30 percent.
  - e. 60 percent.
3. Evaluation of Quality Control Tests: Replace Work in areas where test results fail to comply with requirements indicated.

### **3.15 ADJUSTING**

- A. Patching: Cut, patch, repair, and point-up Portland cement plaster as necessary to accommodate other Work. Point-up finish plaster surfaces around items that are built into or penetrate plaster surfaces.
- B. Imperfections: Repair or replace Work to eliminate cracks, dents, blisters, buckles, crazing, check cracking, dry outs, efflorescence, sweat outs, excessive pinholes, and similar imperfections and where bond to substrate has failed.

### **3.16 FINISH SCHEDULE**

- A. Finish System Color and Texture: As selected by Architect from manufacturer's full range of available standard and custom colors and textures.

**END OF SECTION**

## **SECTION 09 2900**

### **GYPSUM BOARD ASSEMBLIES**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Metal framing systems, interior gypsum board faced walls, partitions, and ceiling assemblies, and supplementary items necessary for installation.

##### **1.2 DEFINITIONS**

- A. Gypsum Board Construction Terminology: Refer to ASTM C 11 for definitions of terms not defined in this Section or in other referenced quality standards.
- B. Damage: Stored or installed gypsum board materials shall be classified as defective and nonconforming Work if they have been exposed to wetness or dampness at any time prior to Substantial Completion or if they exhibit evidence of active or dormant mold or mildew.
- C. Concentrated Loads: Wall or partition mounted equipment, wall finishes, stone facings, lead lined doors and frames, or ornamentation exceeding 15 lbs/sf uniform load, 75 lb. point load, or 50 lb/ lf lineal load.

##### **1.3 DELEGATED ENGINEERING REQUIREMENTS**

- A. Contract Documents Design Intent: Drawings and Specifications indicate design intent for products and systems and do not necessarily indicate or specify total Work required. Contract Documents shall not be construed as an engineered design; furnish and install all Work required for a complete installation.
- B. Project Framing Analysis: Analyze each framing condition for design loads indicated in performance requirements.
  - 1. Provide framing products in sizes and thicknesses required to meet or exceed the criteria based on project loads, spans and in-service conditions.
  - 2. Material Quality Standard for Metal Framing Components: Provide components of sizes indicated but not less than that required to comply with ASTM C 754 for conditions indicated.
- C. Gypsum Board Assemblies Supporting Concentrated Loads - Delegated Engineering Responsibility: Contractor shall employ a qualified professional engineer to provide engineering for products and systems required to support concentrated loads including attachment to building structure required to meet design intent of Contract Documents including, but not limited to, the following.
  - 1. Preparation of structural analysis data including engineering calculations, shop drawings and other submittals signed and sealed by the qualified professional engineer responsible for their preparation.

- D. Gypsum Board Assemblies Withstanding Seismic Loads - Delegated Engineering Responsibility: Contractor shall employ a qualified professional engineer to provide engineering for products and systems required to withstand seismic loads including attachment to building structure required to meet design intent of Contract Documents including, but not limited to, the following.
  - 1. Preparation of structural analysis data including engineering calculations, shop drawings and other submittals signed and sealed by the qualified professional engineer responsible for their preparation.
- E. Delegated Engineering Professional Qualifications: Professional engineer legally authorized to practice in jurisdiction where Project is located and experienced in providing engineering services of kind indicated for products and systems similar to this Project and has a record of successful in-service performance.
- F. Coordination of Contract Documents and Work:
  - 1. Product Variations: In the event of minor differences between products and systems of acceptable or available manufacturer/fabricators. Contractor shall notify Architect of such differences and resolve conflicts in a timely manner. Failure of Contractor to provide notification shall be construed as acceptance of conditions indicated, and changes caused by minor differences between products and Contract Documents shall be included in the Work at no additional cost to Owner.
  - 2. Allowable Adjustments: Minor dimension and profile adjustments may be made in interest of fabrication or erection methods or techniques or ability to satisfy design intent, provided design intent is maintained as determined by Architect. Proposed deviations shall include a detailed analysis of impact to adjacent substrates or other building systems, including related design or construction cost impacts. If accepted by Architect, deviations causing changes in materials, constructability, substrates, or conditions shall be included in the Work at no additional cost to Owner.

#### **1.4 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Include scaled and dimensioned drawings showing locations of control joints. Distinguish between shop and field-assembled work.
  - 1. Gypsum Board Location Schedule: Provide detailed schedule in format similar to "Gypsum Board Schedule" at end of this Section indicating gypsum board products to be installed and their respective locations.

- C. Shop Drawings for Engineered Gypsum Board Assemblies - Concentrated Loads: Scaled and dimensioned drawings showing locations, fabrication, and installation of gypsum board assemblies required to support concentrated loads, including plans, elevations, sections, details of components, and attachments to building structure; include seal and signature of delegated engineering professional responsible for their preparation.
- D. Shop Drawings for Engineered Gypsum Board Assemblies - Seismic Loads: Scaled and dimensioned drawings showing locations, fabrication, and installation of gypsum board assemblies required to withstand seismic loads, including plans, elevations, sections, details of components, and attachments to building structure; include seal and signature of delegated engineering professional responsible for their preparation.

## **1.5 INFORMATIONAL SUBMITTALS**

- A. Delegated Engineering Calculations: Informational submittal for products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation; test reports are not acceptable substitute for calculations.
- B. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
- C. Preconstruction Test Reports for Acoustical Sealant: Compatibility test reports from sealant manufacturer indicating that materials forming joint substrates and joint-sealant backings have been tested for compatibility with sealants; include sealant manufacturer's certification of test results for sealant compatibility and recommendations for primers and substrate preparation needed to obtain adhesion and prevent corrosion of substrate.
- D. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".
- E. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required.
- F. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects.

## **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up to comply with the following requirements, using materials indicated for the completed Work:
  - 1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.

- a. Show typical components, attachments to building structure, and requirements of installation.
    - b. Field Samples for Gypsum Board Finishing: Build 10 ft (3 m) square gypsum board (attached to metal studs) area for each finish level specified. Include not less than one tapered-to-tapered edge gypsum board joint and cut edge-to-cut edge gypsum board joint.
  2. Clean exposed faces of mock-up.
  3. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
  4. Demonstrate the proposed range of aesthetic effects and workmanship.
  5. Protect accepted mock-up from the elements with weather-resistant membrane.
  6. Obtain Architect's acceptance of mockups before starting fabrication.
  7. Maintain mock-ups during construction in an undisturbed condition as a standard for review of the completed Work.
  8. Acceptance of mock-ups does not constitute approval of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor, submitted to Architect in writing, and accepted by Architect in writing.
  9. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.
- C. Fire Resistance Rated Assembly Characteristics: Provide materials and construction identical to those tested according to ASTM E 119/NFPA 251/UL 263 by one of following independent testing and inspecting agency as evidenced by design designation included in their associated approval manual:
1. UL - "Fire Resistance Directory", Category BXUV.
  2. GA 600 - "Fire Resistance Design Manual".
  3. Other agency acceptable to authorities having jurisdiction.
- D. Smoke Resistance Rated Assembly Characteristics: Provide materials and construction identical to those tested according to indicated fire resistance rated assemblies by independent testing and inspecting agency acceptable to authorities having jurisdiction.
- E. Sound (STC) Resistance Rated Assembly Characteristics: Provide materials and construction identical to those tested according to ASTM E 90 and classified according to ASTM E 413 by independent and testing agency acceptable to authorities having jurisdiction.

## **1.7 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

## **1.8 DELIVERY, STORAGE, AND HANDLING**

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

## **1.9 PROJECT CONDITIONS**

- A. Environmental Conditions: Comply with ASTM C 840 requirements or respective gypsum board manufacturer's written recommendations, whichever are more stringent.

- B. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

## **1.10 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
- B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

### **2.3 PERFORMANCE REQUIREMENTS**

- A. General Performance: Provide products and systems to withstand loads within limits of allowable working stresses of the materials involved under conditions indicated and without permanent deformation or failure of materials.
- B. Design Loads: Provide products and systems to withstand design loads including but not limited to gravity, wind, seismic, and erection design loads established by authorities having jurisdiction, applicable local building codes, and as indicated.
  - 1. Structural Movement: Provide products and systems to withstand movements of structure including, but not limited to, drift, twist, column shortening, long-term creep and deflection from uniformly distributed and concentrated live loads. Contractor shall obtain required design data and identify movements accommodated on submittal drawings.
    - a. Accommodate plus or minus 3/8 in (10 mm) differential vertical deflection of floors.
- C. Dimensional Tolerances: Provide products and systems to accommodate dimensional tolerances of framing members and adjacent construction.

### **2.4 SUSPENDED GRID SYSTEM FOR INTERIOR CEILINGS**

- A. Suspension System:
  - 1. Material Quality Standard: ASTM C 645, heavy-duty rating.

2. Description: Manufacturer's standard direct-hung suspended grid system composed of main beams and cross furring members that interlock to form a modular supporting network for application of gypsum board.
3. Protective Coating - Standard Applications: ASTM A 653/A 653M, not less than G40 (Z120), hot-dip galvanized coating, unless otherwise indicated.
4. Main Beams: Inverted T-shaped profile of single or double mounting flange; minimum 1-1/2 in (38 mm) profile height with top bulb and minimum 1-3/8 in (35 mm) wide knurled mounting flange; factory punched for hanger wire, and to receive cross furring members.
5. Cross Furring Members:
  - a. Tees: Inverted T-shaped profile of single or double mounting flange; 1-1/2 in (38 mm) profile height with top bulb and minimum 1-3/8 in (35 mm) wide knurled mounting flange; with ends formed for positive interlocking with main beam.
  - b. Channels: Inverted hat shaped profile; minimum 7/8 in (21 mm) profile height and minimum 1-3/8 in (35 mm) wide knurled mounting flange; with ends formed for positive interlocking with main beam.
6. Wall Angle: Angle shaped profile with each leg not less than 1-1/4 in (32 mm).
7. Curved Members: Where curved ceilings are indicated, members shall be rolled by manufacturer; field fabricated curved members not permitted.
8. Accessories: Specifically designed as an integral part of suspended grid system.
9. Manufacturers and Products:
  - a. Armstrong World Industries Inc.; Drywall Grid System.
  - b. Chicago Metallic Corporation; 650-C/670-C Fire-Rated Drywall Grid System.
  - c. United States Gypsum Company (USG Interiors, Inc.); Drywall Suspension System.

**B. Hanger Attachments to Concrete:**

1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching hanger wires and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by a qualified independent testing agency.
  - a. Cast-in-place anchor, designed for attachment to concrete.
  - b. Post-installed chemical anchor.
  - c. Post-installed expansion anchor.
2. Powder-Actuated Fasteners: Suitable for application indicated, ANSI A 10.3; low velocity, powder-actuated fasteners; drive pins and clip angles fabricated from corrosion-resistant materials, with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, an ultimate load capacity not less than 10 times that imposed by construction as determined by testing according to ASTM E 1190 by a qualified independent testing agency.
3. Manufacturers:
  - a. Construction Materials, Inc.
  - b. Heckman Building Products, Inc.
  - c. Hilti Corp.
  - d. ITW Ramset/Red Head.
  - e. Powers Fasteners.
  - f. Simpson Strong Tie Anchor Systems.

4. For post-tensioned concrete, anchors shall not exceed 1 in (25 mm) embedment. Obtain Structural Engineer's written approval for all proposed anchors in post-tensioned concrete prior to installation.

C. Wire:

1. Material Quality Standard: ASTM A 641 / A 641M, Class 1, zinc-coated, soft annealed, mild steel wire.
2. Tie Wire Minimum Size: Single 0.0625 in (16 gage) (1.6 mm) diameter strand, or double 0.0475 in (18 gage) (1.2 mm) diameter strands. Preformed furring channel clips are acceptable.
3. Hanger Wire Minimum Size: 0.1620 in (8 gage) (4.12 mm) diameter.

D. Rod Hangers: ASTM A 1008 / A 1008M, 7/32 in (0.56 mm) diameter mild carbon steel rod, with primer painted finish.

E. Flat Hangers: ASTM A 1008 / A 1008M, 1 in by 3/16 in (25 mm by 5 mm) by length indicated or required, with primer painted finish.

F. Angle Hangers: ASTM A 36 / A 36M, rolled steel angle, 2 in by 2 in (50 mm by 50 mm), with primer painted finish.

## 2.5 METAL FRAMING COMPONENTS

A. Project Framing Analysis: Analyze each framing condition for design loads indicated in performance requirements.

1. Provide framing products in sizes and thicknesses required to meet or exceed the criteria based on project loads, spans and in-service conditions.

B. Material Quality Standard: Provide components of sizes indicated but not less than that required to comply with ASTM C 754 for conditions indicated.

1. Sheet Steel: ASTM C 645 for metal.
2. Protective Coating - Standard Applications: ASTM A 653/A 653M, not less than G40 (Z120), hot-dip galvanized coating, unless otherwise indicated.
3. Protective Coating - High Moisture / Humidity Applications: ASTM A 653 / A 653M, G90 (Z275) hot-dip galvanized coating at high moisture areas such as Kitchens, Saunas, Steam Rooms, and Pool Enclosures.

C. Metal Studs and Floor Track (Runners):

1. Standard Metal Framing Components for Typical Partitions:
  - a. Stud Description: C-shaped members formed from galvanized sheet steel with 1 1/4 in (32 mm) flange edges bent back 90 degrees and doubled over to form 13/64 in (5 mm) wide minimum return lip; of web depth indicated on Drawings and uncoated base metal thickness indicated in "Metal Framing Schedule" at end of this Section; with web punchouts.

- 1) Alternative Jamb Stud Members - Contractor's Option: "Heavy Duty" or "King" studs; C-shaped members formed from galvanized sheet steel with 3 in (75 mm) flange width; of web depth indicated on Drawings and uncoated base metal thickness indicated in "Metal Framing Schedule" at end of this Section.
  - b. Track (Runner) Description: U-shaped members formed from galvanized sheet steel with depth compatible with studs and flange dimension indicated to hold studs by friction; of same web size and uncoated base metal thickness as studs.
    - 1) Floor Track (Runner): 1-1/4in (32 mm).
    - 2) Top of Wall Track (Runner): 3 in (75 mm).
2. Metal Framing for Shaftwall Partitions:
- a. Stud Description: C-H, double E, C-T, or I-shaped members formed from galvanized sheet steel; of web depth indicated on Drawings and uncoated base metal thickness indicated in "Metal Framing Schedule" at end of this Section; with web punchouts.
  - b. Track (Runner) and Jamb Description: J-shaped track or jamb members formed from galvanized sheet steel with depth compatible with studs and flange dimension indicated to hold studs by friction; of same web size and uncoated base metal thickness as studs.
3. Optional Equivalent Products - Deformed Metal Studs and Tracks (Runners):
- a. Evaluation Criteria: Product test reports and certifications from independent testing agency indicating products comply with requirements and are acceptable to authorities having jurisdiction.
  - b. Material Quality Standard: ASTM A 1003 / A 1003M sheet steel with galvanized coating.
  - c. Stud Description: C-shaped members formed from deformed surface galvanized sheet steel with 1-1/4 in (32 mm) flange edges bent back 90 degrees and bent again to form 3/16 in (5 mm) wide minimum return lip; of web depth indicated on Drawings and uncoated base metal thickness indicated in "Metal Framing Schedule" at end of this Section; with web punchouts.
  - d. Track (Runner) Description: U-shaped members formed from deformed surface galvanized sheet steel with depth compatible with studs and flange dimension indicated to hold studs by friction; of same web size and uncoated base metal thickness as studs.
  - e. Manufacturer and Product: ClarkDietrich Building Systems; ProSTUD.
- D. Flat Straps and Back-Up Plates: Galvanized sheet steel for blocking and bracing in length and width indicated, of same uncoated base metal thickness as adjacent metal studs.
- E. Bridging:
1. Channel: U-shaped members formed from galvanized sheet steel not less than 0.0566 in (16 gage) (1.44 mm) minimum uncoated base metal thickness, with 1/2 in (12 mm) flanges and depth fitting stud punchouts.
  2. Clip Angle: 1-1/2 in by 1-1/2 in (38 mm by 38 mm) L-shaped members formed from galvanized sheet steel not less than 0.0713 in (14 gage) (1.81 mm) uncoated base metal thickness.

- F. Rigid Furring Channels: Hat-shaped members formed from galvanized sheet steel not less than 0.0312 in (20 gage) (0.78 mm) minimum uncoated base metal thickness; 7/8 in (21 mm) depth and minimum 1-3/8 in (35 mm) wide knurled mounting flange.
- G. Resilient Furring Channels: 1/2 in (12 mm) deep members formed from galvanized sheet steel not less than 0.0283 in (22 gage) (0.72 mm) minimum bare-metal thickness, designed to reduce sound transmission.
  - 1. Configuration: Asymmetrical or hat shaped.
- H. Framing Accessories for Spanning Multiple Floors: Framing manufacturers standard connectors, bracings, brackets, clips, gussets, and other framing devices as required by conditions, formed from galvanized sheet steel complying with requirements of main support system.
- I. Z-Shaped Furring: Members formed from galvanized sheet steel not less than 0.0283 in (22 gage) (0.72 mm) minimum bare-metal thickness, with slotted or non-slotted web, face flange of 1-1/4 in (32 mm), wall attachment flange of 7/8 in (21 mm); depth required to fit insulation thickness indicated.
- J. Manufacturers:
  - 1. Building Products Division of Consolidated Fabricators Corp.
  - 2. California Expanded Metal Products Co. (CEMCO).
  - 3. ClarkDietrich Building Systems
  - 4. Marino Ware; Division of Ware Industries.
  - 5. MBA Metal Framing.
  - 6. Scafco Corp.
- K. Heavy-Duty Framing Systems (HDS) Headers and Jambs at Lead Lined Doors: Manufacturer's proprietary shape used to form header beams and jambs, columns or posts, of web depths indicated, unpunched, with stiffened flanges and as follows:
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide ClarkDietrich Building Systems; Heavy Duty Studs - HDS and Header Bracket — HDSC and accessories as required for a complete installation.
    - a. Minimum Base-Steel Thickness: 0.0538 inch (1.37 mm) or as indicated on drawings.
    - b. Web and Flange Widths, Type HDS: 3-5/8 by 3 by 1-1/16 by 3/4 inch (92.1 by 76.2 by 27.0 by 19.1 mm) or 6 by 3 by 2-1/4 by 3/4 inch (152 by 76.2 by 57.2 by 19.1 mm); as indicated on drawings.
    - c. Web and Flange Widths, Type HDSC: 3-1/2 by 3-1/16 by 2 inches (88.9 by 77.8 by 50.8 mm) or 5-7/8 by 3-1/16 by 2 inches (149 by 77.8 by 50.8 mm); as indicated on drawings.
  - 2. Slip-Type Head Joints: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to runners while allowing for vertical movement.
    - a. Basis of Design: ClarkDietrich Building Systems; Fast Top Clip FTC3 or FTC5.

3. Anchor Clips: Pre-punched, galvanized anchor clips designed for use in floor n conditions that provide a positive attachment of studs to runners while allowing for horizontal, torsional and vertical (uplift) loads.
  - a. Basis of Design: ClarkDietrich Building Systems; EasyClip T-Series, T685 or T683.

## **2.6 PRE-ENGINEERED METAL FRAMING COMPONENTS**

### **A. Deflection and Firestop Track (Runner):**

1. Description: Proprietary track (runner) formed from galvanized sheet steel manufactured to accommodate movement of building structure without transferring stress to partition (to prevent cracking of gypsum board resulting from deflection of building structure above) while maintaining continuity of fire resistance rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
2. Manufacturers:
  - a. Metal Stud Framing Manufacturer.
  - b. Fire Trak Corp.
  - c. The Steel Network.

### **B. Flexible Track (Runner):**

1. Description: Proprietary track (runner) formed from galvanized sheet steel manufactured to be flexible and adjustable to fit design requirements; in thickness not less than indicated for studs and in width to accommodate depth of studs.
2. Manufacturers:
  - a. Metal Stud Framing Manufacturer.
  - b. Accu-Arc Curved Wall Products.
  - c. Flex-Ability Concepts.
  - d. Radius Track Corp.

### **C. Headers:**

1. Description: Proprietary header assembly formed from galvanized sheet steel manufactured to bear partition load above openings without transferring stress to partition (to prevent cracking of gypsum board); in thickness not less than indicated for studs and in width to accommodate depth of studs.
2. Manufacturers:
  - a. Metal Stud Framing Manufacturer.
  - b. Brady Construction Innovations, Inc.

## **2.7 GYPSUM BOARD PRODUCTS**

- A. Sizes: Maximum lengths and widths available that will minimize short edge-to-short edge butt joints and to correspond to support system indicated.
- B. Typical Paper-Faced Gypsum Board Products:
  1. Paper-Faced Type X Gypsum Board:

- a. Material Quality Standard: ASTM C 1396 / C 1396M, Type X.
  - b. Description: Noncombustible fire resistant gypsum core with paper surfacing on face, back, and long edges; tapered long edges; 5/8 in (15 mm) thick.
  - c. Manufacturers and Products:
    - 1) American Gypsum Company; FireBloc Type X Gypsum Board.
    - 2) CertainTeed Corporation; Type X Gypsum Board.
    - 3) Georgia-Pacific Gypsum LLC; ToughRock Fireguard Gypsum Board.
    - 4) National Gypsum Company; Gold Bond Fire-Shield Gypsum board.
    - 5) United States Gypsum Company (USG); Sheetrock Firecode Core.
2. Sustainable Paper-Faced Type X Gypsum Board: At Contractor's option, provide sustainable paper-faced Type X gypsum board or typical paper-faced Type X gypsum board.
- a. Material Quality Standard: ASTM C 1396 / C 1396M, Type X.
  - b. Description: Noncombustible fire resistant gypsum core with paper surfacing on face, back, and long edges; tapered long edges; 5/8 in (15 mm) thick. UL Type Designation "ULIX".
    - 1) ISO 14040 Environmental Management, Life Cycle Assessment, Principles and Framework:
      - a) Carbon emissions per Gypsum Association; Industry Standard Type III EPD for North American Type X wallboard with a manufacturing Global Warming Potential of 317.4 kg CO<sub>2</sub>-eq./1000MSF.
      - b) Water reduction per Gypsum Association; Industry Standard Type III EPD for North American Type X wallboard having net use of fresh water value of 1.329 m<sup>3</sup>/1000 ft<sup>2</sup>.
      - c) Primary Energy from non-renewable resources per Gypsum Association; Industry Standard Type III EPD for North American Type X wallboard have a value of 5,291 MJ/1000 ft<sup>2</sup>.
  - c. Basis of Design:
    - 1) United States Gypsum Company, LLC, USG Sheetrock Brand EcoSmart Panels Firecode X.
3. Paper-Faced Type C Gypsum Board:
- a. Material Quality Standard: ASTM C 1396 / C 1396M, Type X.
  - b. Description: Noncombustible fire resistant gypsum core, with additives to enhance fire resistance, with paper surfacing on face, back, and long edges; tapered long edges; 5/8 in (15 mm) thick.
  - c. Manufacturers and Products:
    - 1) American Gypsum Company; FireBloc Type C Gypsum Board.
    - 2) CertainTeed Corporation; Type C Gypsum Board.
    - 3) Georgia-Pacific Gypsum LLC; ToughRock Fireguard C Gypsum Board.
    - 4) National Gypsum Company; Gold Bond Fire-Shield C Gypsum board.
    - 5) United States Gypsum Company (USG); Sheetrock Firecode C Core Gypsum Panels.

4. Paper-Faced Flexible Gypsum Board at Curved Surfaces:

- a. Material Quality Standard: ASTM C 1396 / C 1396M.
- b. Description: Gypsum core with paper surfacing on face, back and long edges; manufactured to bend to fit tight radii and be more flexible than typical panels without wetting; tapered long edges; 1/4 in (6 mm) thick.
- c. Manufacturers and Products:
  - 1) American Gypsum Company; 1/4 ClasicRoc Gypsum Board.
  - 2) CertainTeed Corporation; 1/4 Flex Gypsum Board.
  - 3) Georgia-Pacific Gypsum LLC; ToughRock FlexRoc Gypsum Board.
  - 4) National Gypsum Company; Gold Bond High Flex Brand Gypsum board.
  - 5) United States Gypsum Company (USG); Sheetrock 1/4 Flexible Gypsum Panels.

C. Moisture-Resistant Gypsum Board Products:

1. Moisture-Resistant Paper-Faced Gypsum Board:

- a. Material Quality Standard: ASTM C 1396 / C 1396M, Type X.
- b. Description: Enhanced moisture-resistant, noncombustible gypsum core, with moisture-resistant paper surfacing on face, back and long edges; tapered long edges; score of 10 according to ASTM D 3273; 5/8 in (15 mm) thick.
- c. Manufacturers and Products:
  - 1) American Gypsum Company; M-Bloc Mold and Moisture Resistant Type X Gypsum Board.
  - 2) CertainTeed Corporation; M2Tech Moisture and Mold Resistant Type X Gypsum Board.
  - 3) National Gypsum Company; Gold Bond XP Gypsum Board.
  - 4) United States Gypsum Company (USG); Sheetrock Mold Tough Firecode Gypsum Board.

2. Moisture-Resistant Paperless Glass-Mat Gypsum Board:

- a. Material Quality Standard: ASTM C 1658 / C 1658M.
- b. Description: Enhanced moisture-resistant, noncombustible gypsum core with inorganic, embedded fiberglass mat on both faces; square edges; score or 10 according to ASTM D 3273; 5/8 in (15 mm) thick.
- c. Manufacturers and Products:
  - 1) Georgia-Pacific Gypsum LLC; DensArmor Plus Fireguard Interior Guard.
  - 2) National Gypsum Company; eXP Interior Extreme Gypsum Panels.

3. Moisture-Resistant Paper-Faced Shaft-Liner Gypsum Board:

- a. Material Quality Standard: ASTM C 1396/C 1396M, Type X.
- b. Description: Enhanced moisture-resistant, noncombustible gypsum core with moisture-resistant paper surfacing on face, back and long edges; tapered long edges; score of 10 according to ASTM D 3273; 1 in (25 mm) thick.
- c. Manufacturers and Products:
  - 1) American Gypsum Company; M-Bloc Shaft Liner Panels.

- 2) CertainTeed Corporation; M2Tech Moisture & Mold Resistant Shaftliner.
- 3) National Gypsum Company; Gold Bond 1" Fire-Shield Shaftliner XP.
- 4) USG Corp.; SHEETROCK Mold Tough Gypsum Liner Panels.

4. Moisture-Resistant Paperless Glass-Mat Shaft-Liner Gypsum Board:

- a. Material Quality Standard: ASTM C 1396 / C 1396M.
- b. Description: Enhanced moisture-resistant, noncombustible gypsum core with inorganic, embedded fiberglass mat on both faces, double bevel long edges; score of 10 according to ASTM D 3273; 1 in (25 mm) thick.
- c. Manufacturers and Products:
  - 1) American Gypsum Company; M-Glass Shaft Liner Panels.
  - 2) CertainTeed Corporation; GlasRoc Shaftliner Type X.
  - 3) Georgia-Pacific Gypsum LLC; DensGlass Shaftliner.
  - 4) National Gypsum Company; eXP Extended Exposure Shaftliner.
  - 5) USG Corp.; SHEETROCK Glass-Mat Liner Panels

5. Moisture-Resistant Coated Glass-Mat Gypsum Board Products:

- a. Material Quality Standard: ASTM C 1178 / C 1178M.
- b. Description: Enhanced moisture-resistant, noncombustible, gypsum core with inorganic, embedded fiberglass mat on both sides; outside face coated with heat-cured copolymer water-resistant coating; square edges; score of 10 according to ASTM D 3273; 5/8 in (15 mm) thick.
- c. Manufacturers and Products:
  - 1) CertainTeed Corporation; Diamondback Tile Backer.
  - 2) Georgia-Pacific Gypsum LLC; DensShield Tile Backer.
  - 3) National Gypsum Company; eXP Tile Backer.

6. Moisture-Resistant, Abuse-Resistant Gypsum Board Products:

- a. Material Quality Standard: ASTM C 1629 (C 1629M), Type X, and as follows:
  - 1) Soft Body Impact Test: ASTM E 695, Classification Level 2.
  - 2) Hard Body Impact Test: Annex A1, Classification Level 1.
  - 3) Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
- b. Paper-Faced Products: Specially formulated, noncombustible, gypsum core with heavy liner paper on back and smooth, heavy abrasive-resistant face paper on face and long edges; manufactured to produce greater resistance to surface indentation and through-penetration than typical gypsum panels; tapered long edges; 5/8 in (15 mm) thick.
  - 1) Manufacturers and Products:
    - a) CertainTeed Corporation; Air Renew Extreme Abuse.
    - b) National Gypsum Company; Gold Bond Hi-Abuse XP Gypsum Board.

- c. Paperless Products: Specially formulated, noncombustible, gypsum core with coated, fiberglass mat on both faces; manufactured to produce greater resistance to surface indentation and through-penetration than typical gypsum panels; tapered long edges; 5/8 in (15 mm) thick.
    - 1) Manufacturers and Products:
      - a) National Gypsum Company; Gold Bond eXP Interior Extreme AR Gypsum Panel.
      - b) USG Corporation; Fiberock Interior Panel, Abuse Resistant.
- 7. Moisture-Resistant, Impact-Resistant Gypsum Board Products:
  - a. Material Quality Standard: ASTM C 1629 (C 1629M), Type X, and as follows:
    - 1) Soft Body Impact Test: ASTM E 695, Classification Level 3.
    - 2) Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
  - b. Paper-Faced Products: Specially formulated, noncombustible, gypsum core with heavy liner paper on back and smooth, heavy abrasive-resistant face paper on face and long edges; manufactured to produce greater resistance to surface indentation and through-penetration than typical gypsum panels; tapered long edges; 5/8 in (15 mm) thick.
    - 1) Manufacturers and Products:
      - a) CertainTeed Corporation; Air Renew Extreme Impact.
      - b) National Gypsum Company; Gold Bond Hi-Impact XP Gypsum Board.
  - c. Paperless Products: Specially formulated, noncombustible, gypsum core with coated, fiberglass mat on both faces; manufactured to produce greater resistance to surface indentation and through-penetration than typical gypsum panels; tapered long edges; 5/8 in (15 mm) thick.
    - 1) Manufacturers and Products:
      - a) Georgia-Pacific Gypsum LLC; Dens Armor Plus Impact-Resistant Interior Panels.
      - b) National Gypsum Company; Gold Bond eXP Interior Extreme IR Gypsum Panel.
      - c) USG Corporation; Fiberock Panels, VHI Abuse-Resistant.

## 2.8 TRIM ACCESSORIES

### A. Typical Drywall Trim Accessories:

- 1. Material Quality Standard: ASTM C 1047.
- 2. Description: Trim profile fabricated of galvanized steel sheet; of size suitable for gypsum board thickness; with recessed, perforated flange formed to receive joint compound.
- 3. Trim Products:
  - a. Cornerbead:

- 1) Purpose: For protecting outside (external) corners.
  - 2) Basis of Design: United States Gypsum Company (USG); Dur-A-Bead Corner Bead, 103.
- b. Optional Equivalent Products – Structural Laminate Cornerbead System: At Contractor’s option, provide high strength tapered co-polymer core cornerbead with tight fibered paperboard facing and joint tape paper backing.
- 1) Purpose: For protecting outside (external) corners.
  - 2) Basis of Design: Structus Building Technologies; No-Coat Structural Laminate Drywall Corner System.
- c. LC-Bead (J-Bead):
- 1) Purpose: For protecting exposed edges of gypsum board where back flange can be used.
  - 2) Basis of Design: United States Gypsum Company (USG); J-Trim, 200-A.
- d. L-Bead:
- 1) Purpose: For protecting exposed edges of gypsum board where back flange cannot be used.
  - 2) Basis of Design: United States Gypsum Company (USG); L-Trim, 200-B.
- e. J-Stop:
- 1) Purpose: For protecting edges of gypsum board that does not require finishing.
  - 2) Basis of Design: United States Gypsum Company (USG); J-Stop, 402.
- f. Control Joint:
- 1) Description: One-piece trim formed with V-shaped slot, with removable strip covering slot opening.
  - 2) Purpose: For conditions requiring expansion and contraction stresses of large areas of gypsum board to be relieved.
  - 3) Basis of Design: United States Gypsum Company (USG); Control Joint, 093.
- g. Other Trim or Special Shapes: Products as required by condition.
4. Manufacturers:
- a. Dietrich Industries, Inc.; Unimast.
  - b. Fry Reglet Architectural Metals.
  - c. Marino Ware; Division of Ware Industries.
  - d. Niles Building Products Co.
  - e. Superior Metal Trim; Division of Delta Star, Inc.
  - f. United States Gypsum Company (USG).

B. Plastic Drywall Trim Accessories:

1. Description: Trim profile fabricated of high-impact PVC, of size suitable for gypsum board thickness; with recessed, perforated flange formed to receive joint compound.
2. Trim Products Profiles: As listed above in "Typical Drywall Trim Accessories".
3. Manufacturers:
  - a. Alabama Metal Industries Corporation; a Gibraltar Industries Company.
  - b. Phillips Manufacturing Co.
  - c. Plastic Components, Inc.
  - d. Trim Tex Drywall Products.
  - e. Vinyl Corp., a division of ClarkDietrich Building Systems.

C. Accent Trim Accessories:

1. Description: Extruded aluminum accessories of profiles and dimensions indicated of alloy and temper with not less than strength and durability properties of ASTM B 221, alloy 6063-T5.
2. Basis of Design:
  - a. Aluminum Trim Accessory Type:
    - 1) Manufacturer: Fry Reglet
    - 2) Product: F Reveal Molding
    - 3) Reveal Dimension: 3/4-inch.
    - 4) Finish:
3. Manufacturers:
  - a. Fry Reglet Architectural Metals.
  - b. Gordon, Inc.
  - c. Pittcon Industries.

D. Wall to Aluminum Window Trim Accessories (Perpendicular to Exterior Windows):

1. Sound Barrier Partition/Mullion Trim Cap:
  - a. Description: Pre-assembled, spring loaded, extruded aluminum partition closures fabricated from 6063-T5 temper, tensile strength 31 KSI (ASTM B 221, ASTM B 221 M). STC rated with optional mineral wool batts for additional sound attenuation (approx. STC 48). Seal to mullion and wall or glass and wall with foam gasket, adhesive both sides.
  - b. Manufacturers and Products:
    - 1) Basis of Design: Gordon; "Mullion Mate".
    - 2) STC: 38.
    - 3) Finish: As selected by Architect to match mullion finish.
2. Sound Barrier Partition/Mullion Trim Cap:
  - a. Description: Custom fabricated extruded two-piece aluminum sections of profile indicated on Drawings. Fabricate to engage end of partition and cover mullion. Alloy and temper with not less than strength and durability properties of ASTM B 221, alloy 6063-T5; width as required by condition. Insulate as indicated, seal to glass with compressible foam closure.

- 1) Finish: As selected by Architect to match mullion finish.

## **2.9 FASTENERS**

- A. Limitations: Nails and staples are not permitted.
- B. Fasteners for Attaching Metal Framing to Concrete Structure:
  1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching hanger wires and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by a qualified independent testing agency.
    - a. Cast-in-place anchor, designed for attachment to concrete.
    - b. Post-installed chemical anchor.
    - c. Post-installed expansion anchor.
  2. Powder-Actuated Fasteners: Suitable for application indicated, ANSI A 10.3; low velocity, powder-actuated fasteners; drive pins and clip angles fabricated from corrosion-resistant materials, with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, an ultimate load capacity not less than 10 times that imposed by construction as determined by testing according to ASTM E 1190 by a qualified independent testing agency.
  3. Manufacturers:
    - a. Construction Materials, Inc.
    - b. Heckman Building Products, Inc.
    - c. Hilti Corp.
    - d. ITW Ramset/Red Head.
    - e. Powers Fasteners.
    - f. Simpson Strong Tie Anchor Systems.
  4. For post-tensioned concrete, anchors shall not exceed 1 in (25 mm) embedment. Obtain Structural Engineer's written approval for all proposed anchors in post-tensioned concrete prior to installation.
- C. Metal Framing Screws: Screw fasteners of type, material, size, corrosion resistance, holding power, and other properties required to fasten metal framing and furring members securely to substrates involved; complying with recommendations of gypsum board manufacturers for applications indicated.
- D. Gypsum Board Screws:
  1. Material Quality Standards:
    - a. Metal Framing Members less than 0.03 in (0.75 mm) Thick: ASTM C 1002, Type S.
    - b. Metal Framing Members from 0.033 in to 0.112 in (0.79 mm to 2.9 mm) Thick: ASTM C 954, Type S-12.

2. Product Description - Standard Applications: Bugle head, self-drilling, self-tapping, steel screws with Phillips-head recess of size, holding power, and other properties recommended by respective gypsum board manufacturer; minimum 1 in (25 mm) long; with corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
  3. Product Description - High Moisture / Humidity Applications: Bugle head, self-drilling, self-tapping, stainless steel screws with Phillips-head recess of size, holding power, and other properties recommended by respective gypsum board manufacturer; for use at high moisture areas such as Kitchens, Showers and Tub Enclosures, Saunas, Steam Rooms, and Pool Enclosures.
- E. Miscellaneous Fasteners: For conditions not indicated, fasteners shall be type, finish, size, and holding power recommended by respective gypsum board manufacturer and conditions.

## **2.10 JOINT TREATMENT MATERIALS**

- A. Material Quality Standard: ASTM C 475 / C 475M.
- B. Joint Tape:
1. Paper Tape: Nominal 2 in (50 mm) wide cross-fibered paper tape with finish suitable for bonding, creased in center for easy folding, and compatible with joint compound.
  2. Mesh Tape: Nominal 2 in (50 mm) wide self-adhering 10-by-10 fiberglass mesh tape.
- C. Joint Compound:
1. Setting-Type: Job-mixed powder for mixing with water, chemical-hardening compound; includes taping types.
  2. Drying-Type: Ready-mixed or job-mixed powder for mixing with water, air-drying, vinyl based compounds; includes taping, topping, and all-purpose types.

## **2.11 INTERIOR SURFACING COMPOUNDS**

- A. Level 5 Primer and Surfer: Latex based compound containing polyvinyl acetate (PVA) polymer that can be spray or roller applied to change a Level 4 finish to a Level 5 finish.
1. Manufacturers and Products:
    - a. CertainTeed Corporation; ProRoc Level V Wall and Ceiling Primer/Surfer.
    - b. United States Gypsum Company (USG); Sheetrock Brand Tuff-Hide Primer-Surfer.
- B. Concrete Surfacing Compound: Vinyl-based, factory-formulated product applied in two or more coats as necessary for filling and smoothing to provide monolithic concrete surfaces to match Gypsum Board Level 4 finish.
1. Basis of Design: United States Gypsum Company (USG); Cover Coat Brand Compound.

## **2.12 RELATED MATERIALS**

- A. General: Provide auxiliary materials for gypsum board construction that comply with referenced quality standards and recommendations of gypsum board manufacturer.

- B. Firestopping Products at Penetrations: As specified in Division 07 Section "Penetration Firestopping".
- C. Fiberglass Sound Attenuation Blankets:
1. Material Quality Standard: ASTM C 665, Type I.
  2. Description: Unfaced blankets produced by bonding inorganic glass fibers with a thermosetting binder.
  3. Description: Unfaced blankets produced by bonding inorganic glass fibers with a thermosetting binder; free of formaldehyde.
  4. Surface Burning Characteristics: According to ASTM E 84/NFPA 255/UL 723:
    - a. Flame Spread: Class A - no greater than 25.
    - b. Smoke Developed: No greater than 50.
  5. Thickness: Not less than 2-1/2 in (62 mm), unless otherwise indicated.
  6. Manufacturers and Products:
    - a. CertainTeed Corporation; CertaPro AcoustaTherm Batts.
    - b. Johns Manville Building Insulation Div.; Sound Control Batts.
    - c. Knauf Fiber Glass; QuietTherm.
    - d. Owens Corning; Sound Attenuation Batts.
  7. Basis of Design: Johns Manville; Sound Control Batts, Formaldehyde Free.
- D. Mineral Wool Sound Attenuation Blankets:
1. Material Quality Standard: ASTM C 665, Type I.
  2. Description: Unfaced mineral-fiber blanket insulation produced by combining mineral fibers of rock or slag with thermosetting resins.
  3. Surface Burning Characteristics: According to ASTM E 84/NFPA 255/UL 723:
    - a. Flame Spread: Class A - no greater than 25.
    - b. Smoke Developed: No greater than 50.
  4. Thickness: Not less than 3 in (75 mm), unless otherwise indicated.
  5. Density: Not less than nominal 2.5 pounds per cubic foot.
  6. Manufacturers:
    - a. Fibrex Insulations, Inc.
    - b. Rock Wool Manufacturing Co.
    - c. Roxul.
    - d. Thermafiber LLC.
- E. Acoustical Sealant for Non-Fire Resistance Rated Joints:
1. Description: Manufacturer's standard nonsag, paintable, nonstaining sealant complying with ASTM C 834 or ASTM C 920. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies per ASTM E 90 or other acceptable test method.

- a. Preconstruction Compatibility Testing: Test sealant for compatibility with copper substrates. Testing will not be required if data submitted on previous testing of current sealant products matches those submitted.
  - b. Do not use acrylic, neoprene, and nitrile based sealants that are not recommended for use with copper substrates.
- F. Fire-Resistance Rated and Acoustical Putty Pads:
  - 1. Product Quality Standard: UL 263 (ASTM E 119).
  - 2. Description: Fire-rated, non-hardening, moldable, intumescent compound formed into sheets designed to seal penetrations, construction gaps, and around electrical boxes against spread of fire, smoke, and toxic gases.
  - 3. Manufacturers and Products:
    - a. Grace Construction Products; Flamesafe FSP 1077 Putty Pads.
    - b. Hilti; CP 617 Intumescent Acoustic Putty Pads.
    - c. Hilti; CFS-P PA.
    - d. Specified Technologies, Inc; Series SSP Putty Pads.
    - e. Tremco; TREMstop Electrical Box Insert.
    - f. 3M; Fire Barrier Moldable Putty+Pads.
- G. One-Piece Barrier Box:
  - 1. Description: Rigid reinforced polyethylene box designed to fit around electrical boxes to prevent leaks of air and vapor.
  - 2. Basis of Design: Lessco Air-Vapor Barrier Box.
- H. Fire Resistive Sealants: Intumescent elastomeric sealant as specified in Division 07 Section "Fire-Resistive Joint Firestopping".
- I. Sealants: Sealant as specified in Division 07 Section "Joint Sealants".
- J. Isolation Strips: Adhesive-backed, closed cell neoprene or vinyl foam strips that allow fastener penetration with foam displacement, size as indicated, compressed 50 percent.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective Manufacturer's written installation instructions.
  - 2. Accepted submittals.

3. Contract Documents.
4. Gypsum Association GA 216.
5. United States Gypsum Company (USG); Gypsum Construction Handbook, if no other installation quality standard applies to condition.

- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
- B. Suspended Gypsum Ceilings: Coordinate installation of ceiling suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hanger wires at spacing required to support ceilings and that hangers will develop their full strength.
- C. Coordination with Sprayed Fire-Resistance Materials:
1. Pre-Application Coordination: Before sprayed fire-resistance materials are applied, attach Z shaped clips and offset mounting plates to structural steel members with powder actuated fasteners, leaving portion of flange exposed outside of sprayed fire-resistive materials to attach head of wall track for gypsum board assembly.
  2. Post-Application Coordination: After sprayed fire-resistive materials are applied, remove materials only to extent necessary for installation of gypsum board assemblies, attach Z shaped clips and offset mounting plates to structural steel members with powder actuated fasteners, leaving portion of flange exposed outside of sprayed fire-resistive materials to attach head of wall track for gypsum board assembly, and patch with fire-resistive material specified in Division 07 Section "Cementitious Fireproofing" that is required to obtain fire-resistance rating indicated.

### **3.4 INSTALLATION OF GYPSUM BOARD ASSEMBLIES**

- A. Comply with ASTM C 840.
- B. Resistance Rated Partitions: Construct fire resistance rated, smoke resistance rated, and sound resistance rated partitions according to respective assembly test reports. Ensure every material used within an assembly shall comply with manufacturers listed and product qualities indicated in respective assembly test report.
- C. Penetrations and Openings: Construct within gypsum board assemblies work as required to properly form penetration or opening to receive firestopping materials specified in following Sections:
1. Division 07 Section "Penetration Firestopping".
  2. Division 07 Section "Fire-Resistive Joint Firestopping".
- D. Control Joints: Install control joints at locations indicated on Drawings, in specific locations approved by Architect for visual effect and according to the following:

1. Spaced not more than 30 feet in either direction for uninterrupted straight planes of ceilings and walls.
  2. Where different substrates occur at ceilings and walls.
  3. Where control joints occur in substrates at ceilings and walls.
  4. Where L, U, or T shaped ceiling configurations are joined.
  5. At less-than-ceiling-height cased opening frames and gypsum board openings over 60 inches in width; extend control joints from both corners at top of frame or opening up to ceiling.
  6. Where less-than-ceiling-height door frames occur on walls more than 30 feet in length; extend control joints from top of frame up to ceiling at corner of hinge side of door
  7. Where less-than-ceiling-height borrowed lites occur on walls more than 30 feet in length; extend control joints from top of frame up to ceiling and from bottom of frame to floor at both corners.
- E. Isolation from Building Structure: Isolate gypsum board assemblies from building structure to prevent transfer of loading imposed by structural movement.
1. Provide isolation joints as indicated or required by installation quality standards.
  2. Isolate ceiling assemblies abutting or penetrated by building structure.
  3. Isolate partition framing and wall furring abutting or penetrated by building structure, except at floor.
- F. Building Expansion Joints: Avoid bridging building expansion joints with metal framing or furring members; frame both sides of joints independently with framing or furring members, coordinating with building expansion joint products specified in Division 07 Section "Expansion Control".
- G. Fire-Resistance Rated and Acoustical Putty Pads: Hand apply pads to surfaces indicated, packing tightly into gaps and openings, in such a manner that pad will remain secured to surface; pinch pleat excess material together to close gaps.
- H. One-Piece Barrier Box: Install in accordance with manufacturer's recommendations as indicated on the Drawings.
- I. Supplemental Accessories: Install supplementary framing, blocking, reinforcing, and bracing in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, hand rails, furnishings, or similar construction. Comply with details indicated and recommendations of installation quality standards or manufacturer.

### **3.5 INSTALLING SUSPENDED GRID SYSTEM FOR INTERIOR CEILINGS**

- A. Installation Quality Standard: In addition to standards listed elsewhere, perform suspended ceiling work according to following, unless otherwise specified in this Section:
1. ASTM C 636 / C 636M.
- B. Pattern: Lay out spaces and arrange suspension system in a regular pattern, parallel or perpendicular to surrounding walls.
- C. Hangers for Ceiling System: Suspend hangers from building structural members and as follows:

1. Install hangers plumb and free from contact with mechanical and electrical equipment, insulation or other objects within ceiling plenum that are not part of supporting structural frame or ceiling suspension system. Within limitations allowed by installation quality standards, splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers required to support suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by installation quality standards.
  3. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.
  4. Secure the appropriate hangers to structure, including intermediate framing members, by attaching to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
  5. Install metal framing components for suspended ceilings so that members are level to within 1/8 in in 12 ft (3 mm in 3.6 m) as measured both lengthwise on each member and transversely between parallel members.
  6. Attach hangers to structural members.
  7. Do not connect or suspend any ceiling components from ducts, pipes or conduit.
- D. Perimeters: Using gypsum board screws through gypsum board into metal studs, attach perimeter wall angle where suspended grid system meets vertical surfaces unless otherwise indicated; cut main beams and cross furring members to fit into wall angle.
- E. Main Beams:
1. Suspend main beams spaced 48 in (1200 mm) on center from structure with wire hangers spaced not greater than 48 in (1200 mm) on center.
  2. Install main beams level within 1/8 in in 12 ft (3 mm in 3.6 m) with hanger wire taut and tightly wrapped to prevent vertical movement or rotation.
  3. Do not make local kinks or bends in hanger wires as a means of leveling.
- F. Cross Furring Members:
1. Install cross furring members at right angles to main beams, spaced as required and join to main beams with positive interlock.
  2. Install cross furring members to within 1/32 in (0.8 mm) of their required location and within 0.015 in (0.38 mm) of same horizontal plane as main beam, and never below continuous member.
  3. Install additional cross furring members at right angles to beams and cross furring members to support ends of recessed light fixtures, diffusers or grilles.
- G. Seismic Conditions: Install bracing wires, compression struts, and other components as required by installation quality standard.

### **3.6 INSTALLING METAL FRAMING COMPONENTS**

- A. Priority: Assemble various assemblies giving priority to partitions with higher rating; extend partition with higher rating intact through partition with lower rating.

- B. Joinery and Connections: Install various metal framing components according to details indicated; for situations and conditions not indicated, comply with installation quality standards and with respective manufacturer's recommendations.
- C. General Requirements: Construct partition framing of studs, tracks, and headers using screws of number and spacing required.
1. Install studs of uncoated base metal thickness as determined by Metal Framing Schedule at end of this Section.
  2. Extend partition framing full height to underside of structure above, except where partitions are indicated to terminate at, or immediately above, suspended ceilings.
  3. Continue framing over door frames and openings to provide support for gypsum board.
  4. Space studs as indicated on Metal Framing Schedule at end of this section.
  5. Cut studs 1 in (25 mm) short of full height to provide deflection relief at head of wall conditions.
  6. Install studs so that flanges point in same direction.
  7. Attach with screws through each stud flange and track (runner) flange, except top deflection track assemblies.
  8. For fire resistance rated, smoke resistance rated, and sound resistance rated assemblies that are required to extend to underside of structure above to obtain ratings, install framing around structural and other members extending below floor slabs or roof decks, as needed to support gypsum board closures and make partitions continuous from floor to underside of structure above.
  9. Do not lap studs.
  10. At intersections and corners, locate studs no more than 2 in (50 mm) from partition intersections and corners and secure with screws through both flanges of studs and tracks.
- D. Metal Track (Runner) Requirements:
1. Floors: Install tracks (runners) using appropriate fasteners spaced not more than 16 in (400 mm) on centers.
  2. Head of Wall: Install deep leg deflection tracks using appropriate fasteners to laterally support assembly, and to avoid axial loading of assembly by deflection from building structure above.
  3. Head of Wall: Where indicated, install proprietary deflection and firestop track (runner) using appropriate fasteners for the substrate and installation conditions.
- E. Support for Wall Mounted Accessories or Equipment: Install back-up plate or track (runner) turned on its side, using screws as indicated or as required, to studs to properly transfer accessory or equipment load to metal framing.
- F. Openings: Frame single door, double door, above ceiling openings, and below ceiling openings using studs, tracks (runners), clip angles, and headers.
1. Install 2 studs on each side of each opening in configuration indicated, including strap plates; extend from floor to underside of structure above; do not cut these studs under any circumstances. Include sound attenuation blankets within cavity when partition is scheduled to have a sound resistance rating.
  2. Construct header of appropriate configuration for type of opening to be spanned and secure with clip angles; include sound attenuation blankets within cavity when partition is scheduled to have a sound resistance rating.
  3. Install short intermediate studs 16 in (400 mm) on center between top track and header.

4. At partitions indicated to terminate immediately above ceiling, install diagonal bracing at not less than spacing as indicated.
- G. Supplementary Framing: Install around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, and similar items that cannot be supported directly by metal framing.
- H. Penetrations: Maintain fire-resistance rating of assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.
- I. Chase Partitions:
  1. Position double row of studs vertically in tracks (runners), opposite each other in pairs with flanges pointing in same direction.
  2. Attach with screws through each stud flange and track (runner) flange.
  3. Cross brace between rows of studs with one of following at 48 in (1200 mm) on center maximum vertically, attached to stud webs with screws:
    - a. Coated glass-mat gypsum board, 12 in (300 mm) high by chase width.
    - b. Metal studs turned on side, webs back-to-back.
- J. Furred Walls:
  1. Erect furring channels vertically, spaced 16 in (400 mm) on centers maximum, unless otherwise indicated.
  2. Attach with appropriate fasteners, staggered on flanges.
  3. Splice ends by nesting channels 8 in (200 mm) and securely anchoring to surface.
  4. Miter 24 in (600 mm) long horizontal furring channels at corners and space 24 in (600 mm) on centers vertically.
  5. Locate furring channels around perimeter of openings and secure to surfaces.
- K. Control Joints:
  1. Construct metal framing as indicated by installation quality standard to allow gypsum board control joints to function as intended.
  2. For control joints located in fire resistance rated walls and partitions, construct of metal studs and mineral wool, full height of partition, according to assembly fire test reports.
- L. Metal Framing Spanning Multiple Floors: Construct metal framing as required using longest length metal studs possible and attach to building structure with floor bypass clips.
- M. Curved Partitions:
  1. Metal Track (Runner) shall comply with one of following:
    - a. Field Fabricated From Straight Components:
      - 1) Cut top and bottom runners (tracks) through leg and web at 2 in (50 mm) intervals for arc length. In cutting lengths of runners allow for uncut straight lengths of not less than 12 in (300 mm) at ends of arcs.
      - 2) Bend runners to uniform curve of radius indicated and locate straight lengths so they are tangent to arcs.

- 3) Support outside (cut) leg of runners by clinching a 1 in (25 mm) high by runner thickness sheet metal strip to inside of cut legs using metal lock fasteners.
    - b. Field crimped using a crimping tool.
    - c. Manufactured flexible products.
  2. For full height partitions, attach runners to structural elements at floor and ceiling with appropriate fasteners located 2 in (50 mm) from ends and spaced 12 in (300 mm) on centers.
  3. For ceiling height partitions, attach runners to suspended ceilings with toggle bolts or hollow wall anchors located 2 in (50 mm) from ends and spaced 8 in (200 mm) on centers in between where attached to suspended ceilings.
  4. Position studs vertically with open sides facing in same direction and engaging floor and ceiling runners.
  5. Begin and end each arc with a stud and space intermediate studs equally along arcs at stud spacing recommended by gypsum board manufacturer for radii indicated.
  6. Attach studs to runners with 3/8 in (10 mm) long pan head framing screws. On straight lengths at ends of arcs, place studs 6 in (150 mm) on centers with last stud left free standing.
- N. Installation Tolerances: Install each metal stud metal framing and furring member so that fastening surfaces do not vary more than 1/8 in (3 mm) from plane formed by faces of framing members.

### 3.7 INSTALLING GYPSUM BOARD PRODUCTS

#### A. General Requirements:

1. Install type of gypsum board at location indicated by gypsum board schedule at end of this Section.
2. Do not install damaged gypsum boards.
3. Install gypsum boards with finishable face side out.
4. Butt gypsum boards together for a light contact at edges and ends with not more than 1/16 in (1.5 mm) of open space between panels.
5. Do not force gypsum boards into place.
6. Do not place tapered edges against cut edges or ends.
7. Locate panel joints so that no joint will align with the edge of an opening unless control joints are installed at these locations.

#### B. Isolation from Building Structure:

1. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments or surfaces where movement is anticipated. Provide 1/4 in to 1/2 in (6 mm in 12 mm) wide spaces at these locations or as indicated below:
  - a. At top of wall or where partitions intersect open building structure members projecting below underside of floor slabs and roof decks, cut to fit profile formed by coffers, joists, beams, and other structural members; form proper annular joint to receive firestopping at rated partitions and form 3/4 in (20 mm) joint at top of wall at non-rated partitions.
2. Trim edges with edge trim where edges of gypsum boards are exposed.

3. Seal joints between edges and abutting structural surfaces with firestopping at rated locations and acoustical sealant at non-rated locations.

C. Single-Layer Board Assemblies:

1. At typical conditions, install gypsum board vertically (long dimension parallel to metal framing), to minimize short end-to-short end joints unless otherwise indicated or required by assembly fire test reports.
2. At interior of stairwells and other high walls, install gypsum boards horizontally, unless otherwise indicated or required by assembly fire test reports. Stagger abutting end joints not less than one framing member in alternate courses of gypsum boards.

D. Multi-Layer Board Assemblies: Apply base layers and face layers vertically (long dimension parallel to metal framing) with joints of base layers located over stud or furring member and face layer joints offset at least one stud space from base layer joints, unless otherwise indicated or required by assembly fire test reports. Stagger joints on opposite sides of partitions.

E. Ceiling Applications:

1. Apply gypsum board at right angles to main beams of suspension framing to minimize number of abutting end joints and avoid abutting end joints in central area of each ceiling.
2. Stagger abutting end joints of adjacent panels not less than one framing member.
3. Locate both edge or end joints of gypsum boards over intermediate supports or gypsum board back-blocking where metal framing is not present.

F. Typical Wall Applications:

1. Attach gypsum boards to metal studs so that leading edge or end of each board is attached to open (unsupported) edges of stud flanges first.
2. Stagger vertical joints on opposite sides of partitions.
3. Do not make joints other than control joints at corners of framed openings.
4. Attach gypsum boards to framing provided at doors, openings and cutouts. Install gypsum boards over door heads and extend to not less than one stud space - 16 in (400 mm) at each side of door or opening.
5. Cover both faces of metal framing with gypsum boards as indicated, except in chase walls that are braced internally.
6. Cut and fit gypsum boards around ducts, pipes, conduits, and other penetrations to form proper annular joint to receive firestopping at rated partitions.
  - a. At non-rated partitions, annual space around ducts, pipes, conduit or other penetrations to be properly sized to receive sealant; 3/4 in (20 mm) maximum.
  - b. "Blow-out" patches are not allowed.
7. Support both edge and end joints of gypsum boards over metal framing.

G. Curved Wall Assemblies:

1. Install 2 layers of flexible gypsum board horizontally and unbroken, to extent possible, across curved surface plus 12 in (300 mm) long straight sections at ends of curves and tangent to them.
2. On convex sides of partitions, begin installation at one end of curved surface and fasten gypsum boards to studs as they are wrapped around curve. On concave side, start fastening gypsum boards to stud at center of curve and work outward to panel ends.

3. Fasten base layer to studs with screws spaced 16 in (400 mm) on centers maximum. Center second layer over joints in base layer, and fasten to studs with screws spaced 12 in (300 mm) on centers maximum.

H. Screw Attachments:

1. Attach gypsum board to metal framing with screw fasteners of type appropriate for gypsum board materials and installation conditions:
  - a. Length shall be as required by condition and penetrating metal framing not less than 3/8 in (10 mm).
  - b. Spacing shall be as recommended by installation quality standard, gypsum board manufacturer, or respective assembly test report.
  - c. Use properly adjusted, positive-clutch electric power tool equipped with adjustable screw-depth head and a Phillips bit. Nails and staples are not permitted.
2. Drive screws to slightly dimple surface without breaking face paper, fracturing core, or stripping metal framing member around screw shank.
3. Space screws for non-fire resistance rated partitions and ceilings as recommended by installation quality standards.
4. Space screws for fire resistance rated partitions as required by assembly fire test reports.
5. Start field screwing near center and work towards edges.
6. Space screws not less than 3/8 in (10 mm) from gypsum boards edges.
7. Do not attach gypsum boards to top runner where wall or partition extends to building structure unless required by fire test reports.

I. Control Joints: Form control joints and expansion joints at locations indicated with required space between edges of adjoining gypsum boards.

J. Sound Attenuation Blankets: Install blankets within stud cavities set so that they are held in place by friction with metal studs; ensure blankets are secure within cavity and will not become displaced when second gypsum board side is closed.

K. Elevator Shaft Cants: Where gypsum board shaftwall assemblies cannot be positioned within 4 in (100 mm) of shaft face of structural beams, floor edges, and similar projections into shaft, install 5/8 in (15 mm) thick gypsum board cants covering tops of projections.

1. Slope cant panels at least 75 degrees from horizontal. Set base edge of panels in adhesive and secure top edges to shaft walls at 24 in (600 mm) on centers with screws fastened to shaftwall framing.
2. Where steel framing is required to support gypsum board cants, install framing at 24 in (600 mm) on centers and extend studs from projection to shaftwall framing.

L. Sealant:

1. Comply with ASTM C 919 and manufacturers written recommendations for closing off sound-flanking paths around or through gypsum board assemblies, including sealing partitions above acoustical ceilings.
2. Seal wall assemblies at perimeters, behind control joints, and at openings and penetrations with a continuous bead of sealant material according to following:
  - a. Fire Resistance Sealant: Joints within fire resistance rated assemblies.

- b. Water Resistance Sealant: Joints within non-fire resistance rated assemblies exposed to possible water infiltration.
- c. Acoustical Sealant: All other joints.

### **3.8 INSTALLING TRIM ACCESSORIES**

- A. General: Fasten trim accessories continuously according to accessory manufacturer's instructions using gypsum board screws; installation by clinch-on tool and staples not permitted.
- B. Interior Trim Accessories: Install in the following locations:
  - 1. Corner Beads: Install trim at external corners; use screws at each flange at 9 in (225 mm) on centers, opposite each other.
  - 2. Edge Trim: Install trim where gypsum boards abut dissimilar material, and where edge of gypsum boards would otherwise be exposed; use screws at flange at 9 in (225 mm) on centers.
    - a. LC-Bead (J-Bead): Install trim at exposed conditions where back flange can be attached to framing or supporting substrate before gypsum board installation.
    - b. L-Bead: Install trim at exposed conditions where trim can only be installed after gypsum board installation.
    - c. J-Stop: Install trim at concealed conditions where trim can only be installed after gypsum board installation.
  - 3. Control Joints: Install trim at appropriate locations, ensuring gypsum board is not continuous over joint; use screws at each flange at 6 in (150 mm) on centers.
    - a. Control joints to extend 4 in (100 mm) above finished ceiling at non-rated conditions and extend to structure at rated wall conditions.
- C. Accent Trim Accessories: Install at locations indicated, mitering corners and intersections to form tight, flush and uniform joints; use screws at each flange at 9 in (225 mm) on centers.
- D. Trim Accessories at Exterior Windows: Install at locations indicated, mitering corners and intersections to form tight, flush and uniform joints; use screws at each flange at 9 in (225 mm) on centers or as recommended by manufacturer for manufactured products.

### **3.9 FINISHING GYPSUM BOARD PRODUCTS**

- A. General: Treat board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare surfaces for decoration.
- B. Joint Tape: Finish joints according to following:
  - 1. Typical Paper-Faced Gypsum Board: Paper.
  - 2. Moisture-Resistant Paper-Faced Gypsum Board: Mesh tape.
- C. Finishing: Finish boards and units to achieve specified level of finish as indicated in schedule at end of Section:
  - 1. Typical Paper-Faced Gypsum Board: Either or combination of the following as recommended by manufacturer:

- a. Setting-type joint compounds.
  - b. Drying-type joint compounds.
- 2. Moisture-Resistant Paper-Faced Gypsum Board: Setting-type joint compounds.
- 3. Cementitious Backer Unit: Setting-type joint compounds.

### **3.10 INTERIOR SURFACING COMPOUNDS**

#### **A. Skim Coat Finishing with Joint Compound:**

- 1. Prepare concrete surfaces for applied finishes.
  - a. Grind ridges, fins, and high areas.
  - b. Remove form oil, efflorescence and greasy deposits.
  - c. Fill offsets, voids, bugholes, rock pockets level with surrounding surfaces with joint compound.
  - d. Apply as many coats of joint compound as necessary to eliminate cracks.
  - e. Verify that resulting concrete surface is uniformly smooth and free of irregularities.
- 2. Apply setting-type joint compound or Level 5 Primer and Surfacer over entire surface in thickness recommended by manufacturer.

#### **B. Skim Coat Finishing with Concrete Surfacing Compound:**

- 1. Prepare concrete surfaces for applied finishes.
  - a. Grind ridges, fins, and high areas.
  - b. Remove form oil, efflorescence and greasy deposits.
  - c. Fill offsets, voids, bugholes, rock pockets level with surrounding surfaces with concrete surfacing compound.
  - d. Apply as many coats of concrete surfacing compound as necessary to eliminate cracks.
  - e. Verify that resulting concrete surface is uniformly smooth and free of irregularities.
- 2. Apply Concrete Surfacing Compound over entire surface in thickness recommended by manufacturer.

### **3.11 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.
  - 1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics

### **3.12 ADJUSTMENTS**

- A. Damaged Materials: Stored or installed gypsum board materials shall be classified as damaged, defective, and nonconforming Work if they have been exposed to wetness or dampness at any time prior to Substantial Completion or if they exhibit evidence of active or dormant mold or mildew. Damaged materials and assemblies shall be replaced with new and dry materials and assemblies.

### **3.13 PROTECTION**

- A. Procedures: Protect products and systems from damage during installation and remainder of construction period according to manufacturer's instructions.

### **3.14 METAL FRAMING SCHEDULE**

- A. Metal Stud Framing Schedule:
  - 1. Stud Depth: As indicated on Drawings.
  - 2. Spacing: Maximum 16 in (400 mm) on centers, unless otherwise indicated, or as required to comply with respective assembly test report.
  - 3. Minimum Performance Requirements - unless otherwise indicated:
    - a. Typical Partitions: L/240 at 5 lb/sq ft (239 Pa) lateral load.
    - b. Elevator Shaft Partitions: L/240 at 7.5 lb/sq ft (359 Pa) lateral load.
    - c. Partitions with Tile Facing: L/360 at 7.5 lb/sq ft (359 Pa) lateral load.
    - d. Partitions with Interior Stone Facing Concentrated Loads: Provide delegated engineering to comply with L/720 at 10 lb/sq ft (479 Pa) lateral load.
    - e. Partitions supporting Lead Lined Doors and Frames: Provide delegated engineering to comply with L/480 at 10 lb/sq ft (479 Pa) lateral load.
    - f. Partitions supporting all other Concentrated Loads: Provide delegated engineering to comply with L/360 at 10 lb/sq ft (479 Pa) lateral load
  - 4. Minimum Uncoated Base Metal Thickness:
    - a. Typical Gypsum Board Assemblies: As determined by manufacturer's limiting height engineering data unless otherwise indicated.
      - 1) 25 Gage or 25 Gage Equivalent Studs: Not acceptable.
      - 2) 25 Gage or 25 Gage Equivalent Studs: Typical at partitions without wall-mounted components installed on either side.
      - 3) 22 Gage Studs: Typical partitions unless otherwise indicated.
      - 4) 20 Gage or 20 Gage Equivalent Studs:
        - a) Partitions supporting ceramic or stone tile.
        - b) Partitions with gypsum board on one side only.
        - c) At door jambs.
        - d) Partitions supporting wall hung cabinets or shelving.
        - e) Partitions with lead lining.
      - 5) 20 Gage Studs: Partitions enclosing high-rise elevator shafts and stairwells.
        - a) 20 Gage Equivalent Studs: Allowed only if part of a tested assembly.

6) 16 Gage Studs: Typical at partitions supporting stone facing unless otherwise indicated.

- b. Gypsum Board Assemblies required to Support Concentrated Loads: As required by delegated engineering professional but not less than minimum uncoated base metal thickness indicated above.
- c. Gypsum Board Assemblies required to Withstand Seismic Loads: As required by delegated engineering professional but not less than minimum uncoated base metal thickness indicated above.

### **3.15 GYPSUM BOARD SCHEDULE**

- A. Gypsum Board Schedule, General: Install the designated gypsum board product based on exposure classification to water and / or moisture and applied finish system as follows, unless otherwise indicated or scheduled on the Drawings.
- B. No Exposure: Surfaces not normally exposed to water and / or moisture sources including but not limited to the following:
  - 1. Typical walls and ceilings.
    - a. Paint and Wall Coverings Only: Typical paper-faced gypsum board.
    - b. Tile and Adhered Sheet/Panel Coverings: Moisture-resistant coated-glass-mat gypsum board.
  - 2. Horizontal fire-rated assemblies and ceilings:
    - a. Paint Only: Paper-faced Type C gypsum board.
  - 3. Walls in acoustical barriers as indicated in the Drawings.
    - a. Paint and Wall Coverings Only: Paper-faced acoustically enhanced gypsum board.
  - 4. Curved walls:
    - a. Paint and Wall Coverings Only: Paper-faced flexible gypsum board; installed in two layers.
  - 5. Shaft-Side Face of Shaft-Liner Assemblies:
    - a. No Finish Required: Moisture-resistant paperless glass mat shaft-liner gypsum board.
    - b. No Finish Required: Moisture-resistant paper-faced shaft-liner gypsum board.
- C. Incidental Exposure: Surfaces immediately adjacent to water and / or moisture sources including, but not limited to, the following locations:
  - 1. Walls and ceilings in mechanical equipment rooms and janitor closets.
  - 2. Walls within 24 inches of centerline of drinking fountains, isolated wall-hung lavatories, and countertop sinks and other similar water sources.
  - 3. Interior face of exterior walls.
  - 4. Acceptable gypsum board products for the above listed conditions:

- a. Paint and Wall Coverings: Moisture-resistant paper-faced or moisture-resistant paperless glass-mat gypsum board.
  - b. Tile and Adhered Sheet/Panel Coverings: Moisture-resistant coated-glass-mat gypsum board.
- 5. Top of walls above ceilings adjacent to mechanical equipment in corridors.
  - a. Moisture-resistant paperless glass-mat gypsum board.
- D. Direct Exposure: Surfaces normally soaked, saturated, or regularly and frequently exposed to water and / or moisture including, but not limited to, the following locations:
  - 1. Walls and ceilings in toilet rooms and bathrooms including bathtubs and showers:
    - a. Paint and Wall Coverings: Moisture-resistant paper-faced or moisture-resistant paperless glass-mat gypsum board.
    - b. Tile and Adhered Sheet/Panel Coverings: Moisture-resistant coated-glass-mat gypsum board.
  - 2. Walls and ceilings in saunas, steam rooms, gang showers, and pool enclosures:
    - a. Tile Only: Cementitious backer units.

### **3.16 GYPSUM BOARD FINISHING SCHEDULE**

- A. Gypsum Board Finishing Schedule, General: Finish panels to Levels of Finish indicated below. Apply joint tape over panel joints, except those with trim having flanges not intended for tape. Sand between coats and after last coat to produce a surface free of defects and ready for applied finish system.
  - 1. Levels of Finish: According to ASTM C 840.
- B. Preparation: Apply joint compound at open joints, panel edges, and damaged surface areas.
- C. Level 1: At following locations, embed tape at joints in joint compound unless a higher level of finish is required for fire resistance rated assemblies. Trim accessories to be installed but not embedded in joint compound unless required for fire rating:
  - 1. Ceiling plenum areas above ceilings.
  - 2. Concealed areas.
  - 3. Substrate for interior stone facing.
  - 4. Substrate for interior woodwork.
  - 5. Unfinished areas designated for future expansion.
  - 6. Not used.
- D. Level 2: At following locations, embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges:
  - 1. Substrate for tiling.
  - 2. Not used.
- E. Level 3: At following locations, embed tape and apply separate first and second coats of joint compound to tape, fasteners, and trim flanges:

1. Mechanical, electrical, data and elevator equipment rooms.
  2. Stair towers.
  3. Not used.
- F. Level 4: At following locations, embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges:
1. Areas to receive paint.
  2. Areas to receive wall coverings.
  3. Not used.
- G. Level 5: At following locations, embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges, and apply skim coat of joint compound or Level 5 Primer and Surfacer over entire surface:
1. Areas to receive whiteboard paint or dry erase board coatings.
  2. Curved ceilings and partitions.
  3. Areas as indicated on the Drawings.
  4. Not used.

**END OF SECTION**

## **SECTION 09 3000**

### **TILING**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Modular tiles, membrane underlayments, setting materials, grouting materials, accessories, and supplementary items necessary for installation.

##### **1.2 DEFINITIONS**

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. Module Size: Actual tile size plus joint width indicated.
- C. Face Size: Actual tile size, excluding spacer lugs.
- D. Ceramic (Mosaic) Tile: Tile formed by either the dust-pressed or plastic method, usually 1/4 in to 3/8 in (6 mm to 10 mm) thick, and having a facial area of less than 6 sq in (3900 mm<sup>2</sup>). Ceramic mosaic tile may be of either porcelain or natural clay composition and they may be either plain or with an abrasive mixture throughout.
- E. LHT: Large and Heavy Tile. Tiles are typically larger than 8 in by 8 in (200 mm by 200 mm) or with at least one side greater than 15 in (375 mm) or weigh 5 psf (239 Pa) or heavier and have an ungauged thickness.
- F. Paver Tile: Glazed or unglazed porcelain or natural clay tile formed by dust-pressed method having a facial area of 6 sq in (3900 mm<sup>2</sup>) or more.
- G. Porcelain Tile: A ceramic tile or paver tile that is generally made by the dust-pressed method of a composition resulting in a tile that is dense, impervious, fine grained, and smooth with sharply formed face.
- H. Quarry Tile: Glazed or unglazed tile, made by extrusion process from natural clay or shale usually having a facial area of 6 sq in (3900 mm<sup>2</sup>) or more.
- I. Wall Tile: A glazed tile with a body that is suitable for interior use and which is usually non-vitreous and is not required nor expected to withstand excessive impact or be subject to freezing and thawing conditions.

##### **1.3 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.

- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.
  - 1. Include plans of rooms and elevations of walls showing tile and patterns; include sections showing underlayments, setting materials, and grouting materials.
  - 2. Include details showing widths and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- C. Samples for Verification Purposes: Submit samples for each item listed below of size and construction indicated. Where products involve normal color and texture variations, include sample sets showing the full range of variations expected.
  - 1. Tile: Each type and composition of tile and for each color and finish required, at least 12 in (300 mm) square, mounted on rigid panel, and with grouted joints using product complying with specified requirements and in color approved for completed work.
  - 2. Tile Trim and Accessories: Full-size units of each type and for each color required.
  - 3. Metal Edge Strips: 6 in (150 mm) lengths of specified profile.

#### **1.4 INFORMATIONAL SUBMITTALS**

- A. List of Materials for Layered Mock-Up for Construction Quality Purposes:
  - 1. Product, material, and equipment names, model numbers, lot numbers, batch numbers, source of supply, and other information required to identify items used.
  - 2. Receipt of list does not constitute acceptance of deviations from Contract Documents, unless such deviations are specifically approved by Architect in writing.
- B. Master Grade Certificates: Submit for each shipment, type, and composition of tile, signed by tile manufacturer and installer.
- C. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
- D. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".
- E. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.
- F. Warranty: Sample of warranty.
  - 1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations, and exclusions.

#### **1.5 CLOSEOUT SUBMITTALS**

- A. Maintenance Instructions: Include in operation and maintenance manual required by Division 01 Section "Closeout Requirements". Submit manufacturer's instructions for maintenance of installed work, including methods and frequency for maintaining optimum condition under anticipated use. Include precautions against cleaning materials and methods which may be detrimental to finishes and performance.

## **1.6 MAINTENANCE MATERIAL SUBMITTALS**

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

## **1.7 QUALITY ASSURANCE**

- A. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up to comply with the following requirements, using materials indicated for the completed Work:
1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.
    - a. Show typical components, attachments to building structure, and requirements of installation.
    - b. Build mock-ups in a layered fashion omitting tile in particular areas to reveal underlayment membranes and setting bed installation including but not limited to the following:
      - 1) Tiled floor conditions at thin-set mortar setting beds.
      - 2) Tiled floor conditions at LHT mortar setting beds.
      - 3) Tiled floor conditions at thick-set mortar setting beds.
      - 4) Movement joints at tiled floor conditions.
      - 5) Tiled shower stall including three walls, floor, curb, and threshold.
      - 6) Tiled wall conditions, including one interior corner.
  2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
  3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
  4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
  5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

## **1.8 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

## **1.9 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.
- E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

#### **1.10 PROJECT CONDITIONS**

- A. Environmental Limitations: Install tile only when construction in room is completed and ambient temperature and humidity conditions are being maintained to comply with referenced standards and manufacturer's written instructions.

#### **1.11 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

#### **1.12 WARRANTY**

- A. Installer's Warranty: Furnish installer's written workmanship warranty signed by an authorized representative using installer's standard form agreeing to provide labor required to repair or replace work which exhibits workmanship defects. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

1. Warranty Period: Installer shall warrant the installation to be free from workmanship Defects for a period of 2 years from date of Substantial Completion.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
- B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

1. Selections: As scheduled or as indicated in Design Selections.

#### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

1. Tile: For each tile, obtain of same color, finish, composition, and type, from same source and production run.
2. Setting and Grouting Materials: Obtain ingredients of uniform quality for each mortar and grout component from single manufacturer.

## **2.3 PERFORMANCE REQUIREMENTS**

### **A. Slip Resistance Requirements for Floor Tile:**

1. Standards: Products and installation shall comply with ANSI A137.1, and state and local accessibility standards.
2. Floor Tile Slip Resistance: For tile installed on walkway surfaces, provide products with the following value as determined by testing identical products by the DCOF AcuTest Method per ANSI A137.1:
  - a. Walkway Surfaces: Minimum 0.42.

## **2.4 CERAMIC TILE PRODUCTS**

- A. Material Quality Standard: ANSI A137.1 "Specifications for Ceramic Tiling" for types, compositions, and grades of tiling indicated.
  1. Furnish tiling complying with "Standard Grade" requirements, unless otherwise indicated.
- B. Ceramic Tile, General: Thin ceramic surfacing unit made from clay, porcelain, or mixture of ceramic materials, glazed or unglazed, fired above red heat to temperature sufficient to produce specific physical properties and characteristics specified.
- C. Factory Blending: For tile exhibiting color variations, blend tile in factory and package so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples.
- D. Mounting: Where factory-mounted tile is used, provide back- or edge-mounted tile assemblies as standard with manufacturer. Where tile is intended for installation in wet exposure areas, do not use factory mounted tile assemblies unless tile manufacturer states that this type of mounting is suitable for installation indicated.
- E. Factory-Applied Temporary Protective Coating for Epoxy Grout Installations: Where recommended by tile and grout manufacturer, protect exposed surfaces of tile against adherence of mortar and grout by pre-coating tile face surfaces with a continuous protective film that is easily removable without damaging tile or grout. Do not coat unexposed tile surfaces.

## **2.5 GLASS TILE PRODUCTS**

- A. General: Tile having an overall non-crystalline microstructure with Silica Dioxide as the primary constituent and manufactured by one or more of three primary processes: cast, fused or low-temperature coated.
- B. ANSI Glass Tile Standard: Provide glass tile that complies with ANSI A137.2 for types and other characteristics indicated.
  1. Furnish tiling complying with Standard grade requirements unless otherwise indicated.

## **2.6 STONE TILE PRODUCTS**

- A. Stone Tile, General: Natural quarried stone, pre-fabricated into modular tiles having uniform and consistent dimensional tolerances; with sawn backs.
- B. Material Quality Standard:
  - 1. Granite, ASTM C 615.
  - 2. Limestone, ASTM C 568.
  - 3. Marble, ASTM C 503.
  - 4. Slate, ASTM C 629.

## **2.7 WATERPROOF MEMBRANE UNDERLAYMENTS FOR INTERIOR APPLICATIONS**

- A. General: Manufacturer's standard product that complies with ANSI A118.10 and is acceptable to authorities having jurisdiction for use as shower pan waterproofing, as selected from one of the following available options. Include primer, pre-fabricated corners, seaming cement, detail tape, sealant, and other standard accessory products required for application provided by membrane manufacturer.
- B. Unfaced Plastic Waterproof Membrane Underlayments:
  - 1. Unfaced Chlorinated-Polyethylene (CPE):
    - a. Description: ASTM D 4068, non-plasticized, chlorinated polyethylene; minimum 0.040 in (1.0 mm) nominal thickness.
    - b. Manufacturer and Product: The Noble Company; Chloraloy.
  - 2. Unfaced Polyvinyl Chloride (PVC):
    - a. Description: ASTM D 4551, flexible polyvinyl chloride sheet; minimum 0.040 in (1.0 mm) nominal thickness.
    - b. Manufacturer and Product: Compotite Corporation; Composeal Blue Vinyl 40.
  - 3. Locations: Thick-set shower pan installations.
- C. Faced Plastic Waterproof Membrane Underlayments:
  - 1. Faced Chlorinated Polyethylene (CPE):
    - a. Description: Non-plasticized, chlorinated polyethylene faced on both sides with high-strength, nonwoven polyester fabric; minimum 0.030 in (0.75 mm) nominal thickness.
    - b. Manufacturers and Products:
      - 1) The Noble Company; Nobleseal TS.
      - 2) Laticrete; Hydro Ban Sheet Membrane.
  - 2. Faced Polyvinyl Chloride (PVC):
    - a. Description: ASTM D 4551, multiple layers of polyvinyl chloride sheet heat-fused together and to facings of bondable nonwoven polyester; minimum 0.040 in (1.0 mm) nominal thickness.

- b. Manufacturer and Product: Compotite Corporation; Composeal Gold.
- 3. Locations: Thin-set installations at floors, walls, and ceiling; including thin-set shower pan floor installations.

## **2.8 CRACK ISOLATION MEMBRANE UNDERLAYMENTS**

- A. General: Manufacturer's standard product that complies with ANSI A118.12 as selected from one of the following available options. Include primer, pre-fabricated corners, seaming cement, detail tape, sealant, and other standard accessory products required for application provided by membrane manufacturer.
- B. Fluid-Applied Crack Isolation Membrane Underlayment: Not permitted or allowed within shower and bathtub areas.
  - 1. Description: Manufacturer's proprietary system consisting of liquid applied component and synthetic fabric sheet reinforcement.
  - 2. Manufacturers and Products:
    - a. ARDEX Engineered Cements; Ardex 8 + 9 Waterproofing and Crack Isolation Membrane.
    - b. Custom Building Products; 9240 Waterproofing and Crack Isolation Membrane.
    - c. Laticrete International Inc.; Laticrete 9235 Waterproof Membrane.
    - d. Laticrete International Inc.; Blue 92 Anti-Fracture Membrane.
    - e. Mapei Corp.; Mapelastic 400.
- C. Faced Chlorinated Polyethylene (CPE) Crack Isolation Membrane Underlayment:
  - 1. Description: Non-plasticized, chlorinated polyethylene faced on both sides with high-strength, nonwoven polyester fabric; minimum 0.030 in (0.75 mm) nominal thickness.
  - 2. Manufacturer and Product: The Noble Company; NobleSeal CIS.

## **2.9 SETTING (MORTAR AND GROUT) MATERIALS**

- A. Material Quality Standards: ANSI A118 Series as indicated.
- B. Thick-Set Portland Cement Mortar:
  - 1. Material Quality Standard: ANSI A118.1, with the following physical properties:
    - a. Cleavage Membrane: One of the following:
      - 1) Any membrane underlayment product listed and designated by manufacturer to be suitable for thick-set applications.
      - 2) Polyethylene Sheeting: ASTM D 4397, minimum 4 mils (0.10 mm) thick.
    - b. Portland Cement: ASTM C 150, Type I, grey color. Use white color with light colored stone, translucent marble or light color grout as recommended by manufacturer.
    - c. Hydrated Lime: ASTM C 206, Type S or ASTM C 207, Type S.
    - d. Aggregate: ASTM C 144, washed clean and graded natural sand passing 16-mesh sieve.

- e. Reinforcing Wire Fabric: Galvanized, welded wire fabric, 2x2 W0.3/0.3 (2 in by 2 in, 16/16 wire) (50 mm by 50 mm MW2.0/2.0); comply with ASTM A 185 and ASTM A 82 except for minimum wire size.
- f. Suitable for use in thick set mortar beds up to 2 in (50 mm) thick.

C. LHT Latex-Portland Cement Mortar:

- 1. Material Quality Standard: ANSI A118.4, with the following physical properties:
  - a. Manufacturer's premium polymer modified LHT mortar product; gray color. Use white color with light colored stone, translucent marble or light color grout as recommended by manufacturer.
  - b. Integral antimicrobial product added during manufacturing to resist mold and mildew growth.
  - c. Non-sag capability.
  - d. Suitable for use in LHT mortar beds up to 1/2 in (12 mm) thick.
- 2. Manufacturers and Products - Floor Tiling:
  - a. ARDEX Engineered Cements; X 77 Microtec.
  - b. Custom Building Products; ProLite Tile & Stone Mortar.
  - c. Laticrete International, Inc.; Laticrete 255 MultiMax.
  - d. Mapei Corp.; Ultraflex LFT Mortar.

D. Thin-Set Latex-Portland Cement Mortar (For All Tile Types Except Glass):

- 1. Material Quality Standard: ANSI A118.4, with the following physical properties:
  - a. Manufacturer's premium polymer modified thin-set product; gray color. Use white color with light colored stone, translucent marble or light color grout as recommended by manufacturer.
  - b. Integral antimicrobial product added during manufacturing to resist mold and mildew growth.
  - c. Non-sag capability.
  - d. Suitable for use in thin set mortar beds up to 1/4 in (6 mm) thick.
- 2. Manufacturers and Products - Floor Tiling:
  - a. ARDEX Engineered Cements; X 77 Microtec.
  - b. Custom Building Products; ProLite Tile & Stone Mortar.
  - c. Laticrete International, Inc.; Laticrete 254 Platinum Thin-Set Mortar.
  - d. Mapei Corp.; Ultraflex 3 Mortar.
- 3. Manufacturers and Products - Wall Tiling:
  - a. ARDEX Engineered Cements; X 77 Microtec.
  - b. Custom Building Products; ProLite Tile & Stone Mortar.
  - c. Laticrete International, Inc.; Laticrete 255 MultiMax Multipurpose Thin-Set Mortar.
  - d. Mapei Corp.; Ultralite Mortar.

E. Thin-Set Mortar for Glass Tile:

- 1. Material Quality Standard: ANSI A118.4, manufacturer's premium, glass tile mortar.

2. Manufacturers and Products:

- a. ARDEX Engineered Cements; X 77 Microtec.
- b. Custom Building Products; Glass Tile Premium Thin-Set Mortar.
- c. Laticrete International, Inc.; Glass Tile Adhesive.
- d. Mapei Corp.; Mosaic & Glass Tile Mortar.

F. Epoxy Mortar:

1. Material Quality Standard: ANSI A118.3, with the following physical properties:

- a. 100 percent solids.
- b. Chemical-resistant, water-cleanable, multiple component product.
- c. Resistant to intermittent exposure to temperatures of up to 212 deg F. (100 deg C.).
- d. Rated extra heavy service according to ASTM C 627.
- e. Will not stain when used for stone tile, and acceptable to stone supplier.

2. Manufacturers and Products:

- a. ARDEX Engineered Cements; WA Epoxy Grout and Adhesive.
- b. Custom Building Products; EBM Lite Epoxy Bonding Mortar.
- c. Laticrete International, Inc.; Latapoxy 300.
- d. Mapei Corp.; Kerapoxy 410.

G. Latex-Portland Cement Grout for Tile Joints:

1. Unsanded Grout:

a. Material Quality Standard: ANSI A118.7, with following physical properties:

- 1) Manufacturer's premium polymer modified unsanded grout product.
- 2) Integral antimicrobial product added during manufacturing to resist mold and mildew growth.

b. Manufacturers and Products:

- 1) ARDEX Engineered Cements; FG-C Unsanded Grout.
- 2) Custom Building Products; Prism Surecolor Grout.
- 3) Laticrete International, Inc.; Permacolor Grout.
- 4) Mapei Corp.; Ultracolor Plus Grout.

c. Locations: Tile Joints less than 1/8 in (3 mm) wide.

2. Sanded Grout:

a. Material Quality Standard: ANSI A118.7, with following physical properties:

- 1) Manufacturer's premium polymer modified sanded grout product.
- 2) Integral antimicrobial product added during manufacturing to resist mold and mildew growth.

b. Manufacturers and Products:

- 1) ARDEX Engineered Cements; FL Rapid Set, Flexible, Sanded Grout.
- 2) Custom Building Products; Prism Surecolor Grout.
- 3) Laticrete International, Inc.; Permacolor Grout.
- 4) Mapei Corp.; Ultracolor Plus Grout.

c. Locations: Tile Joints 1/8 in (3 mm) wide and larger.

H. Epoxy Grout:

1. Material Quality Standard: ANSI A118.3, with following physical properties:
  - a. 100 percent solids.
  - b. Chemical-resistant, water-cleanable, multiple-component product.
  - c. Resistant to intermittent exposure to temperatures of up to 212 deg F. (100 deg C.).
  - d. Mold and mildew resistant.
2. Manufacturers and Products:
  - a. ARDEX Engineered Cements; WA Epoxy Grout.
  - b. Custom Building Products; CEG-IG 100% Solids Industrial Grade Epoxy Grout.
  - c. Laticrete International, Inc.; Latapoxy 2000 Industrial Grout.
  - d. Mapei Corp.; Kerapoxy IEG CQ.

I. Proprietary Epoxy Grout: Proprietary high performance epoxy grout; provides high degree of stain resistance; cleanable to the original color.

1. Material Quality Standard: ANSI A118.3.
2. Manufacturers and Products:
  - a. Laticrete International, Inc.; SpectraLOCK PRO Grout.
  - b. Mapei Corp.; Kerapoxy CQ.

## 2.10 ELASTOMERIC SEALANTS

A. Sealant Colors: Match color of adjacent grout unless otherwise indicated.

B. Mildew-Resistant Floor or Wall Joint Sealant:

1. Material Quality Standard: ASTM C 920, Type S, Grade NS, Class 25, with following physical properties:
  - a. Integral antimicrobial product added during manufacturing to resist mold and mildew growth.
  - b. Intended for sealing interior ceramic tile joints and other nonporous substrates.
  - c. Resistant to in-service exposures of high humidity and temperature extremes.
2. Description: One-part mildew-resistant silicone sealant.
3. Manufacturers and Products:
  - a. ARDEX Engineered Cements; SX.
  - b. Custom Building Products; Commercial 100% Silicone Caulk.
  - c. Dow Corning Corp.; 786.

- d. Laticrete International, Inc.; Latasil.
- e. Pecora Corp.; 898.
- f. Tremco Inc.; Tremsil 200.

C. Chemical Resistant Floor Joint Sealant:

- 1. Description: Two-part self-leveling epoxy sealant.
- 2. Manufacturers and Products:
  - a. BASF Construction Chemicals; MasterSeal CR 190 (Formerly Sonneborn Epolith-P).
  - b. Euclid Chemical Co.; Euco 800.
  - c. L&M Construction Chemical Inc.; Epoflex SL.

D. Backer Rods:

- 1. Material Quality Standard: ASTM C 1330, Type B.
- 2. Description: Non-gassing (when punctured), bi-cellular polyethylene or polyolefin foam rod with a surface skin, of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- 3. Manufacturers and Products:
  - a. BASF Construction Chemicals; MasterSeal 921 (Formerly Sonneborn Soft Backer Rod).
  - b. Nomaco Inc.; Sof Rod.

E. Backer Tape: Bond-breaking polyethylene or other plastic tape, self-adhesive where applicable, recommended by sealant manufacturer for preventing sealant from adhering to back of joint where such adhesion would result in sealant failure.

## 2.11 RELATED MATERIALS

- A. Cementitious Underlayments: Trowelable or self-leveling as required by conditions; pre-mixed, latex-modified, Portland cement based formulation provided by or specifically approved by setting material manufacturer; include primers if required for concrete substrate condition.
- B. Patching Compounds: Trowelable pre-mixed, latex-modified, Portland cement based formulation provided by or specifically approved by setting material manufacturer; include primers if required for concrete substrate condition.
- C. Metal Transition Strips (Tile to Adjacent Flooring Material):
  - 1. Schluter Systems LP; Schiene, stainless steel.
- D. Glass-Fiber Tape: Self-adhering, alkali-resistant, glass-fiber tape, 10 by 10 or 10 by 20 threads per 1 in (25 mm).; minimum 2 in (50 mm) wide.
- E. Tile Cleaner: Neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, provided by or specifically approved by tile and grout manufacturers.
- F. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints and that does not change color or appearance of grout.

## **2.12 MIXING MORTARS AND GROUT**

### **A. General Procedures:**

1. Mix to comply with referenced quality standards and manufacturers' written instructions.
2. Add materials, water, and additives in accurate proportions.
3. Use type of mixing equipment, speeds, containers, time, and other procedures to produce uniform quality with optimum performance characteristics for installations indicated.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

#### **A. Acceptance of Surfaces and Conditions:** Examine substrate surfaces to which tile will be installed for compliance with requirements, installation tolerances, and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with the Contract Documents. Starting work within a particular area will be construed as acceptance.

1. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
2. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

### **3.2 INSTALLATION, GENERAL**

#### **A. Installation Quality Standard:** In addition to standards listed elsewhere, perform tile work according to following, unless otherwise specified:

1. Respective manufacturer's written installation instructions.
2. Accepted submittals.
3. Contract Documents.
4. ANSI A108 installation method indicated.
5. TCNA installation method indicated.

#### **B. General Requirements:**

1. Extend tile into recesses and under or behind equipment and fixtures to form a complete covering without interruptions unless otherwise indicated.
2. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
3. Accurately form intersections and returns.
4. Perform cutting and drilling of tile without marring visible surfaces.
5. Grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints, to form smooth edges.
6. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars, or covers overlap tile by not less than 1/8 in (3 mm).

#### **C. Jointing Pattern:**

1. Unless otherwise indicated, lay tile in grid pattern.

2. Align joints when adjoining tiles on floor, base, walls, and trim are same size.
3. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting.
4. Provide uniform joint widths of size recommended by tile and grout manufacturer unless otherwise indicated.
5. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so that extent of each sheet is not apparent in finished work.

- D. Wainscots: Lay out tile to next full tile beyond dimensions indicated, and finish with bullnose shape.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
- B. Substrate Cleaning: Remove curing compounds, coatings, laitance, efflorescence, concrete dust, dirt, oil, gypsum board dust, paint, and other residue that would adversely affect or reduce bonding.
- C. Concrete Floor Preparation:
1. Prepare concrete floor substrates to comply with flatness tolerance of 1/4 in in 10 ft (6 mm in 3 m) as follows:
    - a. Fill cracks, holes and depressions with trowelable cementitious underlayments and patching compounds.
    - b. Remove concrete protrusions, bumps, and ridges by sanding or grinding.
  2. If substrate does not have fine broom finish, mechanically scarify concrete substrates to not less than ICRI CSP 4 finish.
  3. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 in per foot (1:50) toward drains.
- D. Substrate Joints, Gaps, Penetrations, and Different Substrates within Shower and Tub Enclosures: Prior to installing tile, seal the following joints, gaps, and spaces between differing materials as follows:
1. Base of Wall Joints within Shower and Tub Enclosures: Apply wall joint sealant at joint between Coated Glass-Mat Water Resistant Board (specified in Division 09 Section "Gypsum Board Assemblies") and Tub Enclosure or Prefabricated Shower Receptor, Thick-set Mortar Bed, or floor slab to create water resistant barrier in accordance with TCNA Installation B420.
  2. Penetrations: Apply wall joint sealant at penetrations through wall substrates to create water resistant barrier; especially at piping and valve penetrations.
  3. Toilet Accessories: Apply wall joint sealant at fastener penetrations and around perimeter of backing plates to create water resistant barrier.
  4. Joints and Corners: Apply glass-fiber tape to joints and corners of substrates within Showers and Tub Enclosures with thin-set mortar.

- E. Blending: Verify tile has been factory blended and packaged as specified; if not, either return to manufacturer or blend tiles at site before installing.
- F. Field-Applied Temporary Protective Coating: Where needed to prevent grout from staining or adhering to exposed tile surfaces, pre-coat with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

### **3.4 WATERPROOF MEMBRANE UNDERLAYMENT INSTALLATION**

- A. Installation Quality Standard: ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and bonded securely to substrate.
- B. General Requirements:
  - 1. If required by manufacturer, prime concrete substrate.
  - 2. Install to produce a continuous waterproof membrane of uniform thickness bonded securely to substrate, without wrinkles, bubbles, buckles or kinks.
  - 3. For sheets, overlap and seal seams.
  - 4. Turn membrane up wall at locations where tile is scheduled for wall or base.
  - 5. Roll installed sheet if required by manufacturer.
  - 6. Install tile after waterproofing has cured and been tested determined it is watertight.

### **3.5 CRACK ISOLATION MEMBRANE UNDERLAYMENT INSTALLATION**

- A. General Requirements:
  - 1. If required by manufacturer, prime concrete substrate.
  - 2. Install to produce a continuous crack isolation membrane of uniform thickness bonded securely to substrate, without wrinkles, bubbles, buckles, or kinks.
  - 3. For sheets, overlap and seal seams.
  - 4. For liquid applied products, brush or roll liquid uniformly over area in number of coats required and install reinforcing fabric.
  - 5. Roll installed sheet if required by manufacturer.
  - 6. After installation of tile, install floor joint sealant in tile joints recommended by manufacturer to coordinate with membrane strips.

### **3.6 TILE INSTALLATION**

- A. Comply with TCNA's "Handbook for Ceramic Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
- B. Installation Quality Standard: Install tile according to following standards:
  - 1. Thick-set Mortar: ANSI A108.1 and A108.5; for recessed subfloor.
  - 2. LHT Mortar: ANSI A108.5; for floor tiles larger than 8 in by 8 in (200 mm by 200 mm) or with at least one side greater than 15 in (375 mm) and where subfloor is not recessed.
  - 3. Thin-set Latex-Portland Cement Mortar: ANSI A108.5; for floor tiles 8 in by 8 in (200 mm by 200 mm) and smaller where subfloor is not recessed; and for interior wall tiles.
  - 4. Epoxy Mortar: ANSI A108.9.
  - 5. Latex-Portland Grout: ANSI A108.10, typical unless indicated otherwise.

6. Epoxy Grout: ANSI A108.9, where indicated.
- C. Back Buttering: For following installations, obtain minimum 95 percent mortar coverage as in referenced ANSI A108 series of installation standards:
    1. Exterior tile floors.
    2. Tile floors and ceilings in wet and limited water exposures.
    3. Tile floors installed with epoxy mortars.
    4. Tile floors composed of tiles 12 in by 12 in (300 mm by 300 mm) or larger.
    5. Tile floors composed of rib-backed tiles.
  - D. Grout Joint Widths: Install the respective types of tile with the following grout joint widths, unless otherwise recommended by tiling and grout manufacturers.
    1. Ceramic Mosaic Tile - Less than 6 sq in (3900 mm<sup>2</sup>): 1/16 in (1.5 mm).
    2. Paver Tile - 6 sq in (3900 mm<sup>2</sup>) or More: 1/4 in (6 mm).
    3. Quarry Tile - 6 sq in (3900 mm<sup>2</sup>) or More: 1/4 in (6 mm).
    4. Stone Tile: 1/4 in (6 mm).
  - E. Metal Trim: Install at locations indicated and where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.
  - F. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

### **3.7 MOVEMENT JOINTS**

- A. Movement Joints, General: Installation Quality Standard: In accordance with TCNA Movement Joint Design Essentials EJ171 and as specified below.
- B. Wall Joints: The following conditions shall not be grouted; install wall joint sealant and backer rod or backer tape:
  1. Gypsum board assembly control joints.
  2. Building expansion joints, unless scheduled for expansion joint cover.
  3. Interior corners of tiled walls, including shower and bathtub walls.
  4. Around substrates and tile at penetrations through tiled substrates.
  5. At one side of changes in direction or plane of wall.
  6. At joint closest and parallel to changes in substrates supporting tile between wall and floor.
- C. Floor Joints:
  1. General Requirements:
    - a. Where full coverage crack isolation membrane is not provided, continue construction, contraction (control), and expansion joints in building structure through tile work.
    - b. Isolate tile work that abuts a restraining structure or assembly.
    - c. When metal trim or sealant/backer is used for joint, width shall not be less than width of joint in building structure.
    - d. Tile shall not be placed over building expansion joints.

2. Schedule of Sealant Products and Locations:

- a. Latex-Portland Cement Grouted Floors: Install floor joint sealant with backer rod at horizontal joints in mortar and grout setting conditions.
- b. Epoxy Grouted Floors: Install chemical resistant floor joint sealant full depth without backer rod at horizontal joints in epoxy grout setting conditions.
- c. Epoxy Mortar and Grouted Floors: Install chemical resistant floor joint sealant full depth without backer rod at horizontal joints in epoxy mortar and grout setting conditions.

3. Interior Movement Joint Spacing: As indicated on Drawings and as specified below:

- a. Tile Exposed to Direct Sunlight or Moisture: 8 ft to 12 ft (2.4 m to 3.6 m) on center each way.
- b. Tile Not Exposed to Sunlight: 20 ft to 25 ft (6 m to 7.5 m) on center each way.

D. Interior Floor Joint Installation Schedule: Seal interior floor movement joints, as defined by TCNA, according to following schedule:

1. Construction Joints: Floor joint sealant and backer rod.
2. Contraction (Control) Joints: Floor joint sealant and backer rod.
3. Isolation Joints: Floor joint sealant and backer rod.
4. Tile Expansion Joints: Floor joint sealant and backer rod.
5. Perimeter Joints between Wall and Floors: Floor joint sealant with backer tape.

### 3.8 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.

1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.

### 3.9 TESTING

A. Shower Receptor Test: Where shower floors and receptors are made water-tight by the application of the waterproof membrane, the completed membrane installation shall be tested at each installation.

1. The pipe from the shower drain shall be plugged and the receptor area shall be filled with water to a depth of not less than 2 in (50 mm) measured at the threshold.
2. Where a threshold of adequate height does not exist a temporary threshold shall be constructed to retain the test water to the stated depth.
3. The water shall be retained for a test period of not less than 24 hours, and there shall not be evidence of leakage.
4. Report results of tests, both successful and unsuccessful. In addition to results, report shall include date of test, project name, list of products being applied and tested, name of applicator, name of Contractor, and conditions causing failure of waterproofing membrane in event of an unsuccessful test.

5. Materials and installations failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense

### **3.10 CLEANING**

#### **A. Cleaning:**

1. Acids are not permitted, nor will they be allowed.
2. Clean tile surfaces so they are free of foreign matter.
3. Remove grout residue from tile as soon as possible.
4. No sooner than 10 days after installation, clean grout smears and haze from tile according to tile and grout manufacturer's written instructions. 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.
5. Protect metal surfaces and plumbing fixtures from effects of cleaning.
6. Flush surfaces with clean water before and after cleaning.
7. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

### **3.11 DEMONSTRATION**

- #### **A. Cleaning and Maintenance Training:** Provide instruction to Owner's personnel for cleaning and maintenance of installed work, including methods and frequency for maintaining optimum condition under anticipated use; include precautions against cleaning materials and methods which may be detrimental to finishes and performance.

### **3.12 PROTECTION**

- #### **A. Coverings:** When recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.
- #### **B. Traffic Restrictions:** Prohibit foot and wheel traffic from tiled floors for at least 7 days after grouting is completed.

### **3.13 INTERIOR TILE INSTALLATION SCHEDULE**

#### **A. Floors, Concrete Substrate - Recessed:**

1. TCNA Installation Method F111 (Cleavage Membrane) at Slabs-on-Grade: Thick-set reinforced Portland cement mortar bed over cleavage membrane over concrete subfloor; Latex-Portland Cement Grout.
2. TCNA Installation Method F121 (Waterproof Membrane) at Elevated Slabs: Thick-set reinforced Portland cement mortar bed over waterproof membrane over concrete subfloor; Latex-Portland Cement Grout.

#### **B. Floors, Kitchens, and Food Service Areas, Concrete Substrate - Recessed:**

1. TCNA Installation Method F114 (Cleavage Membrane) at Slabs-on-Grade: Thick-set reinforced Portland cement mortar bed over cleavage membrane over concrete subfloor; Epoxy Grout.
  2. TCNA Installation Method F114 (Waterproof Membrane) at Elevated Slabs: Thick-set reinforced Portland cement mortar bed over waterproof membrane over concrete subfloor; Epoxy Grout.
- C. Floors, Kitchens, and Food Service Areas, Concrete Substrate - LHT Mortar:
1. TCNA Installation Method F115 (Cleavage Membrane) at Slabs-on-Grade: Latex-Portland cement mortar bond coat over concrete subfloor; Epoxy Grout.
  2. TCNA Installation Method F115A (Waterproof Membrane) at Elevated Slabs: Latex-Portland cement mortar bond coat over concrete subfloor; Epoxy Grout.
- D. Floors, Concrete Substrate:
1. TCNA Installation Method F125-Full (Crack Isolation Membrane; full coverage): Thin-set Latex-Portland cement mortar over crack isolation membrane over concrete subfloor; Latex-Portland Cement Grout.
    - a. Location: Where scheduled in the Room Finish Schedule located on the drawings and in all thin-set tile locations which have neither waterproofing nor sound isolation scheduled.
  2. TCNA Installation Method F125-Partial (Crack Isolation Membrane; coverage only at visible cracks in substrate): Thin-set Latex-Portland cement mortar over crack isolation membrane over concrete subfloor; Latex-Portland Cement Grout.
    - a. Location: Where scheduled in the Room Finish Schedule located on the drawings and in all thin-set tile locations which have neither waterproofing nor sound isolation scheduled.
  3. TCNA Installation Method F122 (Waterproof Membrane): Thin-set Latex-Portland cement mortar over waterproof membrane over concrete subfloor; Latex-Portland Cement Grout.
    - a. Location: As scheduled in the Room Finish Schedule located on the drawings.
  4. TCNA Installation Method F122 (Sound Isolation Membrane): Thin-set Latex-Portland cement mortar over sound isolation membrane over concrete subfloor; Latex-Portland Cement Grout.
    - a. Location: As scheduled in the Room Finish Schedule located on the drawings.
- E. Floors, Elevator Car, Cementitious Backer Unit Substrate:
1. TCNA Installation Method F144: Thin-set Epoxy mortar over cementitious backer unit; Epoxy Grout.
- F. Walls, Gypsum Board Substrate:
1. TCNA Installation Method W243: Thin-set Latex-Portland cement mortar over coated-glass-mat gypsum board; Latex-Portland Cement Grout.

G. Walls, Concrete or Masonry Substrate:

1. TCNA Installation Method W202: Thin-set Latex-Portland cement mortar over concrete or masonry; Latex-Portland Cement Grout.

H. Walls, Gypsum Board Substrate, Bathtub / Shower Surfaces:

1. Walls, Including Tub Unit or Pre-Fabricated Shower Receptors: TCNA Installation Method B419 (Waterproof Membrane): Thin-set Latex-Portland cement mortar over waterproof membrane over coated-glass-mat gypsum board; Latex-Portland Cement Grout.
2. Shower Receptors: TCNA Installation Method B420 (Waterproof Membrane): Thin-set Latex-Portland cement mortar over waterproof membrane over coated-glass-mat gypsum board walls and concrete subfloors; Latex-Portland Cement Grout.

**3.14 TILE FINISH SCHEDULE**

- A. See Interior Finish Legend on the drawings.

**END OF SECTION**





## **SECTION 09 5113**

### **ACOUSTICAL PANEL CEILINGS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Acoustical lay-in ceiling panels, exposed metal suspension systems, and supplementary items necessary for installation.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Product Schedule: Use same designations indicated on the Finish Schedule and Drawings.
- C. Samples for Verification Purposes: Full-size units of each type of ceiling assembly indicated; in sets for each color, texture, and pattern specified, showing the full range of variations expected in these characteristics.
  - 1. Acoustical Panels: Set of 6 in (150 mm) square samples of each type, color, pattern, and texture.
  - 2. Exposed Suspension-System Members, Moldings, and Trim: Set of 12 in (300 mm) long samples of each type, finish, and color.

##### **1.3 INFORMATIONAL SUBMITTALS**

- A. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.

##### **1.4 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: To include in maintenance manuals.

##### **1.5 MAINTENANCE MATERIAL SUBMITTALS**

- A. Extra Materials: Furnish the following extra materials that match and are from same production runs as products installed, packaged with protective covering for storage and identified with labels describing contents:
  - 1. Acoustical Ceiling Panels: Full-size units equal to 2 percent of amount installed.
  - 2. Suspension System Components: Quantity of each exposed component equal to 2 percent of amount installed.

##### **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the

successful production and in-service performance of products and systems similar to scope of this Project.

#### **1.7 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

#### **1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver acoustical panels, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

#### **1.9 PROJECT CONDITIONS**

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

#### **1.10 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
  - 1. Armstrong World Industries, Inc.
  - 2. CertainTeed Corporation.
  - 3. Chicago Metallic Corporation.
  - 4. USG Interiors, Inc.; Subsidiary of USG Corporation.
- B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

## **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.
  - 1. Obtain both acoustical ceiling panels and suspension system from the same manufacturer if both are offered by the manufacturer.

## **2.3 PERFORMANCE REQUIREMENTS**

- A. General Performance: Products and systems shall be engineered to withstand loads within limits of allowable working stresses of the materials involved under conditions indicated and without permanent deformation or failure of materials.
- B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
  - 2. Smoke-Developed Index: 450 or less.
- C. Seismic Standards: Provide acoustical panel ceilings designed and installed to withstand the effects of earthquake motions according to the following:
  - 1. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580.
  - 2. Cisca's Recommendations for Acoustical Ceilings: Comply with Cisca's "Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings-Seismic Zones 0-2".
  - 3. ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads".

## **2.4 ACOUSTICAL PANELS, GENERAL**

- A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectance's, unless otherwise indicated.
  - 1. Selections: As scheduled or as indicated in Design Selections.

## **2.5 METAL SUSPENSION SYSTEMS, GENERAL**

- A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635/C 635M.
- B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.
  - 1. High-Humidity Finish: Comply with ASTM C 635/C 635M requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.

- C. Attachment Devices: Size for five times design load indicated in ASTM C 635/C 635, Table 1, "Direct Hung", unless otherwise indicated.
1. Comply with seismic design requirements.
  2. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per ASTM E 488/E 488M or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
    - a. Cast-in-place anchors, designed for attachment to concrete.
    - b. Post-installed expansion anchors.
    - c. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 for Class SC1 service condition.
  3. Powder-Actuated Anchors: Suitable for application indicated, ANSI A10.3; low velocity, powder-actuated fasteners; drive pins and clip angles fabricated from corrosion-resistant materials, with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, an ultimate load capacity not less than 10 times that imposed by construction as determined by testing according to ASTM E 1190 by a qualified independent testing agency.
    - a. Manufacturers:
      - 1) Construction Materials, Inc.
      - 2) Heckman Building Products, Inc.
      - 3) Hilti Corp.
      - 4) ITW Ramset/Red Head.
      - 5) Powers Fasteners.
      - 6) Simpson Strong Tie Anchor Systems.
  4. For post-tensioned concrete, anchors shall not exceed 1 in (25 mm) embedment. Obtain Structural Engineer's written approval for all proposed anchors in post-tensioned concrete prior to installation.
- D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
1. Wire:
    - a. Zinc-Coated Carbon-Steel Wire: ASTM A 641 / A 641M, Class 1 zinc coating, soft temper.
    - b. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304, nonmagnetic; for use at MRI and related spaces.
  2. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106 in (2.69 mm) diameter wire.
- E. Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces and complying with requirements of authorities having jurisdiction or as recommended by manufacturer.
- F. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic

forces and complying with requirements of authorities having jurisdiction.

- G. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in-place and complying with requirements of authorities having jurisdiction.
- H. Edge Moldings and Trim: Manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material and finish as that used for exposed flanges of suspension system runners.
  - 1. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
- I. Wide-Face, Capped, Double-Web, Stainless Steel Suspension System: Main and cross runners roll formed from cold-rolled Type 304 or 316 non-magnetic stainless steel sheet, standard of manufacturer, with 15/16 in (24 mm) wide polished stainless steel caps on flanges.
  - 1. Structural Classification: Intermediate-duty system.
  - 2. End Condition of Cross Runners: Override (stepped) type.
  - 3. Face Design: Flush face.
  - 4. Cap Material: Polished stainless steel sheet.
  - 5. Manufacturers and Products:
    - a. Armstrong World Industries, Inc.; SS Prelude Plus XL.
    - b. Chicago Metallic Corporation; 730 System - All Stainless Steel.
    - c. USG Interiors, Inc.; Donn DXSS.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. ASTM C 636 / C 636M.
  - 2. Respective manufacturer's written installation instructions.
  - 3. Accepted submittals.
  - 4. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
- B. Coordination: Furnish layouts for cast-in-place anchors, clips, and other ceiling anchors. Furnish cast-in-place anchors and similar devices to other trades for installation well in advance of time needed for coordinating other work.
- C. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

### **3.4 INSTALLATION OF ACOUSTICAL PANEL CEILINGS**

- A. Suspend ceiling hangers from building's structural members and as follows:
  - 1. Install hangers plumb and free from contact with mechanical and electrical equipment, insulation, or other objects within ceiling plenum that are not part of supporting structural frame or ceiling suspension system. Within limitations allowed by installation quality standards, splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  - 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by installation quality standards.
  - 3. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
  - 4. Do not support ceilings directly from permanent metal forms. Fasten hangers to cast-in-place hanger inserts, power-actuated fasteners, or drilled-in anchors that extend through forms into concrete.
  - 5. Do not attach hangers to steel deck tabs.
  - 6. Do not attach hangers to steel roof deck. Attach hangers to structural members.
  - 7. Space hangers not more than 48 in (1200 mm) on center along each member supported directly from hangers, unless otherwise indicated; and provide hangers not more than 8 in (200 mm) from ends of each member.
  - 8. Do not connect or suspend any ceiling components from ducts, pipes or conduit.
  - 9. Do not make local kinks or bends in hanger wires as a means of leveling.
- B. Install edge moldings and trim at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
  - 1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
  - 2. Screw attach moldings to substrate at intervals not more than 16 in (400 mm) on center and not more than 3 in (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 in per 12 ft (3 mm per 3.6 m). Miter corners accurately and connect

- securely.
  - 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
  - 4. Provide control joints where joints occur in abutting surfaces.
  - 5. Hold tees in place with concealed clips.
- C. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- 1. Space steel main runners at 48 in (1200 mm) on center.
  - 2. Space aluminum main runners at 24 in (600 mm) on center.
- D. Install acoustical panels with undamaged edges and fitted accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
- 1. Arrange directionally patterned acoustical panels with pattern running in one direction parallel to long axis of space.
  - 2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
  - 3. For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
  - 4. For reveal-edged panels on suspension system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension system surfaces and panel faces flush with bottom face of runners.
  - 5. Paint cut panel edges remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

### **3.5 PROTECTION**

- A. Protect products and systems from damage during installation and remainder of construction period according to manufacturer's instructions.

### **3.6 CLEANING**

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

### **3.7 ACOUSTICAL PANEL CEILING SCHEDULE**

- A. See Interior Finish Legend on drawings.:

**END OF SECTION**

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2019-07-26

ACOUSTICAL PANEL CEILINGS

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## **SECTION 09 6115**

### **CONCRETE FLOOR SEALER**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Work required of this Section includes sealing of exposed interior concrete floors as a finished floor material along with supplementary items necessary to complete work required for their installation.
- B. Related Section:
  - 1. Division 03 Section "Concrete Finishing" for other floor sealers and curing agents not used as interior finish flooring.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, instructions for evaluating, preparing, and treating the substrate, installation instructions, and recommendations for maintenance.

##### **1.3 INFORMATIONAL SUBMITTALS**

- A. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.

##### **1.4 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: Submit to include in manual specified in Division 01 Section "Closeout Procedures". Include recommendations for periodic inspections, cleaning, care, maintenance, and repair of coatings.

##### **1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 2 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Mockups: Provide a full-coat benchmark finish sample. Select one room or surface, not less than 100 square feet, to represent surfaces and conditions for application of coating and substrate. Apply sealer materials according to requirements for the completed Work, after permanent lighting and other environmental services have been activated. After finish is accepted, the room or surface will be used to evaluate coatings of remainder of work.

## **1.6 PROJECT CONDITIONS**

- A. Environmental Conditions: Apply sealer materials within the range of ambient and substrate temperatures recommended by the manufacturer. Do not apply to a damp or wet substrate, when relative humidity exceeds 85 percent, or when temperatures are less than 5 deg F above dew point.

## **1.7 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
- B. Available Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, manufacturers offering products that may be incorporated into Work include but are not limited to those listed.

### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

### **2.3 SEALING COMPOUND**

- A. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
  - 1. Manufacturers and Products:
    - a. Burke by Edoco; Cureseal 1315 WB.
    - b. ChemMasters; Polyseal WB.
    - c. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Sealcure 1315 WB.
    - d. Euclid Chemical Company (The); Super Diamond Clear VOX.
    - e. Kaufman Products, Inc.; Sure Cure 25 Emulsion.
    - f. Lambert Corporation; UV Safe Seal.
    - g. L&M Construction Chemicals, Inc.; Lumiseal WB Plus.
    - h. Meadows, W. R., Inc.; Vocomp-30.
    - i. Metalcrete Industries; Metcure 30.
    - j. Symons Corporation, a Dayton Superior Company; Cure & Seal 31 Percent E.
    - k. Tamms Industries, Inc.; LusterSeal WB 300.
    - l. Unitex; Hydro Seal 25.
    - m. US Mix Products Company; US Spec Radiance UV-25.
    - n. Vexcon Chemicals, Inc.; Vexcon Starseal 1315.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.
  - 1. Do not proceed with application until after the minimum concrete curing period recommended by coating manufacturer.
  - 2. Verify substrate is visibly dry and free of moisture.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.

### **3.3 SURFACE PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
- B. Mask off adjoining surfaces not being sealed and close off drains and other penetrations to prevent spillage and migration of liquids.
- C. Remove grease, oil, paints, or other penetrating contaminants from concrete. Remove concrete fins, ridges, or other projections. Remove material to provide a sound surface free of laitance, glaze, or efflorescence. Remove remaining loose material and clean surfaces according to ASTM D 4258.

### **3.4 APPLICATION**

- A. General: Apply materials according to respective manufacturer's instructions, approved submittals and Contract Documents.
- B. Sealer: Apply by spray, roller, or other applicators according to manufacturer's recommended coverage rate.

**END OF SECTION**

**17-13 OSU, College of Osteopathic Medicine at  
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2019-07-26**

**CONCRETE FLOOR SEALER**

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**SECTION 09 6500**  
**RESILIENT FLOORING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes: Resilient flooring products and systems and supplementary items necessary for installation.
- B. Related Section:
  - 1. Resilient wall base, reducer strips, and other accessories installed with resilient flooring are specified in Division 09 Section "Resilient Base and Accessories".

**1.2 ALLOWANCES**

- A. Concrete Moisture Barrier Allowance: Include allowance to provide Concrete Moisture Barrier Floor Treatment to concrete floor decks.

**1.3 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings for Special Patterns: Show layout and details of special patterns for resilient flooring.
- C. Product Schedule: Use same designations indicated on the Finish Schedule and Drawings.
- D. Samples for Verification Purposes: In manufacturer's standard size, but not less than 6 in by 9 in (150 mm by 230 mm) sample of each different color and pattern of resilient flooring product specified, showing the full range of variations expected in these characteristics. Label each sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in Schedules.
  - 1. Heat-Welded Sheet Flooring: For heat-welding bead, manufacturer's standard-size samples, but not less than 9 in (225 mm) long, of each color specified.
  - 2. Seam Samples for Sheet Flooring: For each color and pattern of resilient sheet flooring product required; with seam running lengthwise and in center of 6 in by 9 in (150 mm by 230 mm) sample applied to a rigid backing and prepared by installer for this Project.

**1.4 INFORMATIONAL SUBMITTALS**

- A. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.

- B. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required.

#### **1.5 CLOSEOUT SUBMITTALS**

- A. Maintenance Instructions: Include in operation and maintenance manual as required by Division 01 Section "Closeout Procedures". Submit manufacturer's instructions for **maintenance of installed work, including methods and frequency for maintaining optimum condition under anticipated use. Include precautions against cleaning materials and methods which may be detrimental to finishes and performance.**

#### **1.6 MAINTENANCE MATERIAL SUBMITTALS**

- A. Extra Materials: Furnish the following extra materials that match and are from same production runs as products installed, packaged with protective covering for storage and identified with labels describing contents:
  - 1. Resilient Tile Flooring: Furnish not less than 1 box for each 50 boxes or fraction thereof, of each type, color, pattern, class, wearing surface, and size of tile flooring product installed.
  - 2. Resilient Sheet Flooring: Furnish not less than 10 linear ft (3 linear m) in roll form and full roll width, for each 500 linear ft (150 linear m) or fraction thereof, of each color, pattern, and type of sheet flooring product installed.

#### **1.7 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Slip Resistance: Provide products identical to those tested for slip resistance per ASTM D 2047 with a static coefficient of friction not less than 0.6 for level surfaces and 0.8 for ramped surfaces.
- C. Fire-Test-Response Characteristics: Provide products with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction.
  - 1. Critical Radiant Flux: Class I, 0.45 W/sq. cm or greater when tested per ASTM E 648.
  - 2. Smoke Density: Maximum specific optical density of 450 or less when tested per ASTM E 662.

#### **1.8 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

#### **1.9 DELIVERY, STORAGE, AND HANDLING**

- A. Store flooring products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

1. Resilient Tile Flooring: Store floor tiles on flat surfaces.
2. Resilient Sheet Flooring: Store sheet flooring rolls upright.

#### **1.10 PROJECT CONDITIONS**

- A. Maintain a temperature of not less than 70 deg F (21 deg C) or more than 85 deg F (29 deg C) in spaces to receive products for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless otherwise recommended by manufacturer.
- B. Maintain flooring products prior to installation at the same temperature as the space where they are to be installed.
- C. Close spaces to traffic during flooring installation and for time period after installation recommended by manufacturer.
- D. Install flooring products after other finishing operations, including painting, have been completed.
- E. Do not install flooring over concrete substrates until slabs have cured and are sufficiently dry to bond with adhesive, as determined by flooring manufacturer's recommended tests. Refer to "Preparation" Article for requirements.

#### **1.11 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
  1. Vinyl Flooring:
    - a. Altro Group.
    - b. Armstrong World Industries, Inc.
    - c. Congoleum Corporation.
    - d. Forbo Flooring, Inc.
    - e. Gerflor, Architectural Floor Systems, Inc.
    - f. Lonseal, Inc.
    - g. Mannington Mills, Inc.
    - h. Tarkett, Inc.
  2. Rubber Flooring
    - a. AB; American Biltrite.
    - b. Flexco.
    - c. Nora Systems, inc.

- d. PRF USA, Inc.
- e. R.C.A. Rubber Company (The).
- f. VPI, LLC, Floor Products Division.

- B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

- 1. Selections: As scheduled or as indicated in Interior Finish Legend on drawings.

## 2.2 MATERIALS, GENERAL

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

## 2.3 RESILIENT TILE FLOORING MATERIALS

- A. Vinyl Composition Floor Tile Standard: ASTM F 1066, Class 2, through-pattern tile, unless otherwise indicated.

- 1. Size: 12 in by 12 in by 0.125 in (300 mm by 300 mm by 3 mm).

- B. Solid Vinyl Floor Tile Standard: ASTM F 1700, Class 1, monolithic vinyl tile, unless otherwise indicated.

- 1. Size: 12 in by 12 in by 0.125 in (300 mm by 300 mm by 3 mm).

- C. Rubber Floor Tile: ASTM F 1344, Class I, unless otherwise indicated.

- 1. Size: 12 in by 12 in by 0.125 in (300 mm by 300 mm by 3 mm).

## 2.4 RESILIENT SHEET FLOORING MATERIALS

- A. Vinyl Sheet Floor Coverings: ASTM F 1303, Type I or II, Grade 1, Class A (fibrous) or B (nonfoamed plastic) backing or ASTM F 1913 unbacked as required by product selection.

- B. Rubber Sheet Floor Coverings: ASTM F 1859, Type I (homogeneous rubber sheet).

- C. Sheet Flooring Thickness: 0.125 in (3 mm).

- D. Heat-Welding Seam Bead: Solid-strand product of floor covering manufacturer for heat welding seams.

- 1. Selections: As scheduled or as indicated in Design Selections.

- E. Integral Cove Base Accessories: Resilient accessories recommended by flooring manufacturer with selections as follows:

- 1. Basis of Design: Burke Mercer Flooring Products; Division of Burke Industries, Inc.

- a. Cap Strip: No. 040 round vinyl cap.
- b. Cove Strip: No. 070 flexible vinyl cove stick with nominal 1 in (25 mm) radius.

- c. Reducer: No. 633 vinyl reducer, 1 in (25 mm) wide by 1/8 in (3 mm) high

## **2.5 ACCESSORY MATERIALS**

- A. Concrete Slab Primer: Non-staining type as recommended by flooring manufacturer.
- B. Trowelable Leveling and Patching Compounds: Latex-modified, Portland-cement-based formulation provided or approved by flooring manufacturer for products and applications indicated.
- C. Adhesives: Water-resistant type recommended by flooring manufacturer suitable for products, applications, and substrate conditions indicated.
  - 1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
    - a. Typical Flooring: Not more than 50 g/L.
    - b. Rubber Flooring: Not more than 60 g/L.
- D. Concrete Moisture Barrier Floor Treatment:
  - 1. Epoxy-Based Moisture Barrier Floor Treatment: Two-component, high-performance, non-flammable, rapid drying, water based, low odor, low VOC, two-component, penetrating epoxy; formulated to reduce moisture vapor transmission and surface alkalinity from concrete substrates, including aged or freshly placed ("green") concrete, prior to installation of impervious glued-down finish flooring specified in other Division 09 sections.
    - a. Basis of Design (Product Standard): Bostik, Inc.; D-250.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer's written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.

### 3.3 PREPARATION

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
- B. Concrete Substrates: Prepare according to ASTM F 710.
  - 1. Verify that concrete substrate finishes comply with requirements specified in Division 03 Section "Concrete Finishing" for concrete substrates receiving resilient flooring.
  - 2. Verify that concrete substrates are free of cracks, ridges, depressions, scale, and foreign deposits.
  - 3. Verify that concrete substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Unless concrete has been water-cured, then proceed with the following:
    - a. Bead-blast concrete substrate with an apparatus that abrades the surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
    - b. Repair damaged and deteriorated concrete according to flooring manufacturer's written recommendations.
  - 4. Determine adhesion and dryness characteristics by performing the following tests as recommended by flooring manufacturer.
  - 5. Alkalinity and Adhesion Testing: Perform tests recommended by flooring manufacturer. A pH range of 5 to 9 is required when substrate is wetted with distilled water and pHydration paper is applied. Proceed with installation only after concrete substrates pass testing.
  - 6. Moisture Testing: Perform one or both of the following tests as recommended by flooring manufacturer. Perform 3 moisture tests for first 1000 sf (92.9 sm) of concrete substrate scheduled to receive flooring and 1 test for each additional 1000 sf (92.9 sm) or fraction thereof. Proceed with installation only after concrete substrates pass testing.
    - a. Perform anhydrous calcium chloride test in accordance with ASTM F 1869. Proceed with installation only after concrete substrates have maximum moisture-vapor-emission rate of 3 lbs of water/1000 sf (1.36 kg of water/92.9 sm) in 24 hours.
    - b. Perform relative humidity test using in situ probes in accordance with ASTM F 2170. Proceed with installation only after concrete substrates have a maximum 75 percent relative humidity level measurement.
  - 7. Moisture Barrier Floor Treatment: For concrete substrates not meeting moisture test standards specified above, apply epoxy-based moisture floor treatment and cementitious overcoat to concrete substrate in accordance with manufacturer's written instructions.
- C. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.
- D. Broom and vacuum clean substrates to be covered immediately before flooring product installation. After cleaning, reexamine substrates for moisture, alkaline salts, carbonation, or dust. Do not proceed with installation until unsatisfactory conditions have been corrected.

### **3.4 INSTALLATION OF RESILIENT FLOORING, GENERAL**

- A. Apply concrete slab primer, if recommended by flooring manufacturer, prior to applying adhesive. Apply according to manufacturer's directions.
- B. Scribe, cut, and fit flooring to butt neatly and tightly to vertical surfaces and permanent fixtures, including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.
- C. Extend flooring into toe spaces, door reveals, closets, and similar openings. Extend flooring to center of door openings.
- D. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on substrate. Use chalk or other nonpermanent, non-staining marking device.
- E. Adhere flooring to substrates using a full spread of adhesive applied to substrate to comply with flooring manufacturer's written instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times.
  - 1. Provide completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- F. Hand-roll flooring in both directions from center out to embed flooring in adhesive and eliminate trapped air according to manufacturer's written instructions. At walls, door casings, and other locations where access by roller is impractical, press flooring firmly in place with flat-bladed instrument.

### **3.5 INSTALLATION OF RESILIENT TILE FLOORING**

- A. Lay out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half of a tile at perimeter.
- B. Match tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Cut tiles neatly around all fixtures. Discard broken, cracked, chipped, or deformed tiles.
  - 1. Lay tiles square with room axis, unless otherwise indicated.
  - 2. Lay tiles with grain running in one direction, unless otherwise indicated.

### **3.6 INSTALLATION OF RESILIENT SHEET FLOORING**

- A. Unroll sheet flooring and allow it to stabilize before cutting and fitting, if recommended in writing by manufacturer.
- B. Lay out sheet flooring to comply with the following requirements:
  - 1. Maintain uniformity of sheet flooring direction.
  - 2. Arrange for a minimum number of seams and place them in inconspicuous and low-traffic areas, and not less than 6 in (150 mm) away from parallel joints in flooring substrates.
  - 3. Match edges of sheet flooring for color shading and pattern at seams according to manufacturer's written recommendations.

4. Avoid cross seams.
- C. Integral Cove Base: Form integral cove base by flashing sheet flooring up vertical surfaces. Support flooring at horizontal and vertical junction with cove strip. Butt flooring at top of base against cap strip.
- D. Heat-Welded Seams: Rout joints and heat weld with welding bead, permanently fusing sections into seamless flooring. Prepare, weld, and finish seams according to manufacturer's written instructions and ASTM F 1516 to produce surfaces flush with adjoining flooring surfaces.
- E. Chemically Bonded Seams: Chemically bond seams with bonding compound, permanently fusing sections into seamless flooring. Prepare seams and apply compound according to manufacturer's written instructions and ASTM F 693 to produce tightly fitted seams without gaps, overlays, or excess bonding compound on flooring surfaces.
- F. Access Flooring Panel Substrate: Install cement board substrate over access flooring panel substrate before installation of resilient flooring.

### **3.7 CLEANING AND PROTECTING**

- A. Perform the following operations immediately after installing flooring products:
  1. Remove adhesive and other surface blemishes from exposed surfaces using cleaner recommended by flooring manufacturer.
  2. Sweep or vacuum floor thoroughly.
  3. Do not wash floor until after time period recommended by flooring manufacturer.
  4. Damp-mop floor to remove marks and soil.
- B. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods recommended in writing by flooring manufacturer.
  1. Cover products installed on floor surfaces with undyed, untreated building paper until just prior to Substantial Completion.
  2. Do not move heavy and sharp objects directly over floor surfaces. Place plywood or hardboard panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

### **3.8 RESILIENT FLOORING SCHEDULE**

- A. See Interior Finish Legend on drawings.

**END OF SECTION**

## **SECTION 09 6513**

### **RESILIENT BASE AND ACCESSORIES**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Resilient wall base, resilient flooring accessories, and supplementary items necessary for installation.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Product Schedule: Use same designations indicated on the Finish Schedule and Drawings.
- C. Samples for Verification Purposes: In manufacturer's standard size, but not less than 12 in (300 mm) sample of each different color and pattern of resilient product specified, showing the **full range of variations expected in these characteristics.**

##### **1.3 INFORMATIONAL SUBMITTALS**

- A. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.

##### **1.4 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: To include in maintenance manuals.

##### **1.5 MAINTENANCE MATERIAL SUBMITTALS**

- A. Extra Materials: Furnish the following extra materials that match and are from same production runs as products installed, packaged with protective covering for storage and identified with labels describing contents:
  - 1. Furnish not less than 10 linear ft (3 linear m) for each 500 linear ft (150 linear m) or fraction thereof, of each different type, color, pattern, and size of resilient product installed.

##### **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Fire-Test-Response Characteristics: Provide products with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Critical Radiant Flux: Class I, 0.45 W/sq. cm or greater when tested per ASTM E 648.
2. Smoke Density: Maximum specific optical density of 450 or less when tested per ASTM E 662.

#### **1.7 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

#### **1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by product manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

#### **1.9 PROJECT CONDITIONS**

- A. Maintain a temperature of not less than 70 deg F (21 deg C) or more than 85 deg F (29 deg C) in spaces to receive resilient products for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless otherwise recommended by product manufacturer.
- B. Maintain resilient products prior to installation at the same temperature as the space where they are to be installed.
- C. Close spaces to traffic during installation and for time period after installation recommended by manufacturer.
- D. Install resilient products after other finishing operations, including painting, have been completed.

#### **1.10 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
  1. Armstrong World Industries, Inc.
  2. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
  3. Endura Rubber Flooring; Division of Burke Industries, Inc.
  4. Flexco, Inc.
  5. Johnsonite.
  6. Mondo Rubber International, Inc.
  7. Musson, R. C. Rubber Co.
  8. Nora Rubber Flooring; Freudenberg Building Systems, Inc.

9. Roppe Corporation, USA.

- B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

1. Selections: As scheduled or as indicated in Interior Finish Legend on drawings.

## **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

## **2.3 RESILIENT MATERIALS**

- A. Rubber Wall Base:

1. Standard: ASTM F 1861, Type TS (rubber, vulcanized thermoset) or TP (rubber, thermoplastic), Group 1 and 2.
2. Thickness: Nominal 1/8 in (3 mm).
3. Lengths: Provide longest length(s) available per manufacturer. Provide coils if available in profile(s) indicated.
4. Outside and Inside Corners:
  - a. Job-formed.

- B. Resilient Molding Accessories:

1. Carpeting Accessories: Carpet cove cap, carpet step-off, carpet reducer, carpet edge bar.
2. Resilient Flooring Accessories: Reducer strip and others as required.
3. Material: Rubber.
4. Lengths: Provide longest length(s) available per manufacturer. Provide coils if available in profile(s) indicated.
5. Color and finish as selected by Architect from manufacturer's standard colors.

## **2.4 ACCESSORY MATERIALS**

- A. Adhesives: Water-resistant type recommended by product manufacturer suitable for products, applications, and substrate conditions indicated.

1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
  - a. Wall Base: Not more than 50 g/L.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer's written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

### **3.4 INSTALLATION OF RESILIENT WALL BASE**

- A. Apply wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- B. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- C. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- D. Do not stretch wall base during installation.
- E. Masonry Wall Surfaces: On masonry surfaces or other similar irregular substrates, fill voids along top edge of wall base with manufacturer's recommended adhesive filler material.
- F. Job-Formed Corners: Use straight pieces of maximum lengths possible.
  - 1. Outside Corners: Form without producing discoloration (whitening) at bends. Shave back of base at points where bends occur and remove strips perpendicular to length of base that are only deep enough to produce a snug fit without removing more than half the wall base thickness.
  - 2. Inside Corners: Form by cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave back of base where necessary to produce a snug fit to substrate.

### **3.5 INSTALLATION OF RESILIENT FLOORING ACCESSORIES**

- A. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor coverings that would otherwise be exposed.

### **3.6 CLEANING AND PROTECTING**

- A. Perform the following operations immediately after installing resilient products:
  - 1. Remove adhesive and other surface blemishes from exposed surfaces using cleaner recommended by manufacturer.
  - 2. Sweep or vacuum horizontal surfaces thoroughly.
  - 3. Do not wash resilient products until after time period recommended by manufacturer.
  - 4. Damp-mop surfaces to remove marks and soil.
- B. Protect resilient products against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by resilient product manufacturer.

### **3.7 RESILIENT PRODUCT SCHEDULE**

- A. See Interior Finish Legend on drawings.

**END OF SECTION**

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RESILIENT BASE AND ACCESSORIES

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**SECTION 096566**  
**RESILIENT ATHLETIC FLOORING**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Interlocking, rubber floor tile.
- B. Related Requirements:
  - 1. Section 096513 "Resilient Base and Accessories" for wall base and accessories installed with resilient athletic flooring.

**1.3 COORDINATION**

- A. Coordinate layout and installation of flooring with floor inserts for gymnasium equipment.

**1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Shop Drawings: Show installation details and locations of the following:
  - 1. Border tiles.
  - 2. Floor patterns.
  - 3. Layout, colors, widths, and dimensions of game lines and markers.
  - 4. Locations of floor inserts for athletic equipment installed through flooring.
  - 5. Seam locations for sheet flooring.

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**RESILIENT  
ATHLETIC  
FLOORING**

- C. Samples: For each exposed product and for each type, color, and pattern specified, [6-inch- (150-mm-)] <Insert dimension> square in size and of the same thickness indicated for the Work.
  - 1. Game-Line- and Marker-Paint Samples: Include Sample sets showing game-line- and marker-paint colors applied to flooring.
  - 2. Seam Samples: For each vinyl sheet flooring color and pattern required; with seam running lengthwise and in center of [6-by-9-inch (150-by-230-mm)] <Insert dimensions> Sample applied to a rigid backing and prepared by Installer for this Project.
- D. Samples for Initial Selection: For each type of resilient athletic flooring.
  - 1. Game-Line and Marker Paint: Include charts showing available colors and glosses.
- E. Samples for Verification: For each type, color, and pattern of flooring specified, [6-inch- (150-mm-)] <Insert dimension> square in size and of same thickness and material indicated for the Work.
  - 1. Game-Line- and Marker-Paint Samples: Include Sample sets showing game-line- and marker-paint colors applied to flooring.

## **1.5 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For sheet vinyl flooring Installer.

## **1.6 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For resilient athletic flooring to include in maintenance manuals.

## **1.7 MAINTENANCE MATERIAL SUBMITTALS**

- A. Furnish extra materials[, from the same product run,] that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Floor Tile: Furnish no fewer than 1 box for each 50 boxes or fraction thereof, of each type, color, pattern, and size of floor tile installed.

## **1.8 QUALITY ASSURANCE**

- A. Sheet Vinyl Flooring Installer Qualifications: An experienced installer who has completed sheet vinyl flooring installations using seaming methods indicated for this Project and similar in material, design, and extent to that indicated for this Project; who is acceptable to manufacturer; and whose work has resulted in installations with a record of successful in-service performance.

## **1.9 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storing.
- B. Store materials to prevent deterioration.
  - 1. Store tiles on flat surfaces.

## **1.10 FIELD CONDITIONS**

- A. Install flooring after other finishing operations, including painting, have been completed.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. PLITEQ
- B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.
  - 1. Selections: GenieMat FIT70.
- C. Material: Recycled-rubber compound
- D. Color and Pattern: As selected by Architect from manufacturer's full range.
- E. Border: Interlocking tiles.
  - 1. Border Color and Pattern: Matching floor tile

## **2.2 ACCESSORIES**

- A. Game-Line and Marker Paint: Complete system including primer, if any, compatible with flooring and recommended in writing by flooring and paint manufacturers for use indicated.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance of the Work.
  - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 PREPARATION**

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of flooring.
- B. Concrete Substrates: Prepare according to ASTM F710.
  - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
- C. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended in writing by manufacturer. Do not use solvents.
- D. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.
- E. Move flooring and installation materials into spaces where they will be installed at least 48 hours in advance of installation unless manufacturer recommends a longer period in writing.

1. Do not install flooring until it is the same temperature as space where it is to be installed.
- F. Sweep and vacuum clean substrates to be covered by flooring immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.3 FLOORING INSTALLATION, GENERAL**

- A. Comply with manufacturer's written installation instructions.
- B. Scribe, cut, and fit flooring to butt neatly and tightly to vertical surfaces, equipment anchors, floor outlets, and other interruptions of floor surface.
- C. Extend flooring into toe spaces, door reveals, closets, and similar openings unless otherwise indicated.
- D. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating subfloor markings on flooring. Use nonpermanent, nonstaining marking device.

### **3.4 FLOOR TILE INSTALLATION**

- A. Lay out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
  1. Lay tiles in pattern indicated.
- B. Discard broken, cracked, chipped, or deformed tiles.
- C. Tile Matching: Match tiles for color and pattern by selecting tiles from cartons in same sequence as manufactured and packaged if so numbered.
  1. Lay tiles in pattern of colors and sizes indicated.
- D. Adhered Floor Tile: Adhere products to substrates using a full spread of adhesive applied to substrate to comply with adhesive and flooring manufacturers' written instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times.

1. Provide completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- E. Free-Lay Tile: Place flooring at locations indicated with units securely interconnected and fully seated on substrate to form a smooth, level surface.

### **3.5 GAME LINES AND MARKERS**

- A. Mask flooring at game lines and markers, and apply paint to produce sharp edges. Where crossing, break minor game line at intersection; do not overlap lines.
- B. Apply game lines and markers in widths and colors according to requirements indicated on Drawings

### **3.6 CLEANING AND PROTECTION**

- A. Perform the following operations immediately after completing flooring installation:
1. Remove adhesive and other blemishes from flooring surfaces.
  2. Sweep and vacuum flooring thoroughly.
  3. Damp-mop flooring to remove marks and soil after time period recommended in writing by manufacturer.
- B. Protect flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.
1. Do not move heavy and sharp objects directly over flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

### **END OF SECTION**

## **SECTION 09 6603**

### **PRECAST TERRAZZO FLOORING AT STAIRS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Precast terrazzo flooring products and systems for use at stairs along with supplementary items necessary for installation.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work.
- C. Samples for Initial Selection: NTMA color plates showing the full range of colors and patterns available for each terrazzo type indicated.
- D. Samples for Verification Purposes: For each type, material, color, and pattern of terrazzo and accessory required showing the full range of color, texture, and pattern variations expected. Label each terrazzo sample to identify matrix color and aggregate types, sizes, and proportions. Prepare samples of same thickness and from same material to be used for the Work in size indicated below:
  - 1. Precast Terrazzo: 6 in (150 mm) square samples.
  - 2. Accessories: 6 in (150 mm) long samples of each exposed accessory item.

##### **1.3 INFORMATIONAL SUBMITTALS**

- A. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
- B. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required.
- C. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.

#### **1.4 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: To include in maintenance manuals. Submit manufacturer's instructions for maintenance of installed work, including methods and frequency for maintaining optimum condition under anticipated use. Include precautions against cleaning materials and methods which may be detrimental to finishes and performance. Include product data for flooring care products used or recommended by installer and names, addresses, and telephone numbers of local sources for products.

#### **1.5 QUALITY ASSURANCE**

- A. Installer Qualifications:
  - 1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  - 2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
  - 3. NTMA Membership: Installer shall be a contractor member of NTMA.
- B. NTMA Standards: Comply with NTMA's "Terrazzo Specifications and Design Guide" and with written recommendations for terrazzo type indicated unless more stringent requirements are specified.
- C. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.
  - 1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.
    - a. Show typical components, attachments to building structure, and requirements of installation.
  - 2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
  - 3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
  - 4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
  - 5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

#### **1.6 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.
  - 1. Participants:
    - a. Architect.
    - b. Contractor, including superintendent.
    - c. Installer, including project manager and supervisor.

- d. If requested, Manufacturer's qualified technical representative.
  - e. Installers of other construction interfaced with Work.
2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
- a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
  - b. Review Contract Document requirements.
  - c. Review approved submittals.
  - d. Review inspection and testing requirements.
  - e. Review environmental conditions and procedures for coping with unfavorable conditions.
  - f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
3. Record discussions, including decisions and agreements, and prepare report.

## **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials to project site in supplier's original wrappings and containers, labeled with source's or manufacturer's name, material or product brand name, and lot number, if any.
- B. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

## **1.8 PROJECT CONDITIONS**

- A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.
- B. Control and collect dust produced by grinding operations. Protect adjacent construction from detrimental effects of grinding operations.

## **1.9 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

# **PART 2 - PRODUCTS**

## **2.1 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials

## **2.2 PRECAST CEMENTITIOUS TERRAZZO**

- A. Precast Terrazzo Base Units: Minimum 3/4 in (19 mm) thick, resinous or reinforced-cementitious terrazzo units cast in maximum lengths possible, but not less than 36 in (900 mm).

1. Type: Straight.
  2. Top Edge (Exposed): Beveled with polished top surface.
  3. Outside Corner Units: With finished returned edges at outside corner.
  4. Color and Pattern: Match adjacent terrazzo flooring.
  5. Height: As indicated on drawings.
- B. Precast Terrazzo Units: Comply with NTMA's written recommendations for fabricating precast resinous terrazzo units in sizes and profiles indicated. Reinforce units as required by unit sizes, profiles, and thicknesses and as recommended by manufacturer.
1. Color and Pattern: As scheduled in the Interior Finish Legend.
- C. Abrasive Nosings at Stair Treads and Landings: Abrasive nosing strip and two-line abrasive inserts at nosings and tops of landings.
- D. Precast Terrazzo Finishing:
1. Finish exposed-to-view edges or reveals to match face finish.
  2. Ease exposed edges to 1/8 in (3 mm) radius.

## **2.3 ACCESSORY MATERIALS**

- A. Abrasive Strips for Stair Treads and Landings: Silicon carbide or aluminum oxide in epoxy-resin binder set in channel, 1/2 in (12 mm) wide by depth required by terrazzo thickness by 4 in (100 mm) less than stair width. Color as selected by Architect from manufacturer's full range.
- B. Anchoring Devices: Provide mechanical anchoring devices as recommended by fabricator for proper anchorage and support of units for conditions of installation and support.
- C. Terrazzo Cleaner: Chemically neutral cleaner with pH factor between 7 and 10 that is biodegradable, phosphate free, and recommended by cleaner manufacturer for use on terrazzo type indicated.
- D. Terrazzo Sealer: Slip- and stain-resistant, penetrating-type sealer that is chemically neutral with pH factor between 7 and 10, does not affect color or physical properties of terrazzo, is recommended by sealer manufacturer, and complies with NTMA Guide Specification for terrazzo type indicated.
- E. Joint Sealants: As specified in Division 07 Section "Joint Sealants".

## **2.4 SETTING (MORTAR AND GROUT) MATERIALS**

- A. Material Quality Standards: ANSI A118 Series as indicated.
- B. Medium-Set Latex-Portland Cement Mortar:
1. Setting Bed Depth: Suitable for use in medium set mortar beds up to 3/4 in (19 mm) thick.
  2. Material Quality Standard: ANSI A118.4, with the following physical properties:
    - a. Manufacturer's premium polymer modified Medium-set product; gray color. Use white color with light colored stone, translucent marble or light color grout as recommended by manufacturer.

- b. Integral antimicrobial product added during manufacturing to resist mold and mildew growth.
    - c. Non-sag capability.
  - 3. Manufacturers and Products:
    - a. Custom Building Products; Medium Bed Mortar.
    - b. Laticrete International, Inc.; Laticrete 255 MultiMax.
    - c. Mapei Corp.; Ultraflex LFT Mortar.
- C. Thin-Set Latex-Portland Cement Mortar:
- 1. Setting Bed Depth: Suitable for use in thin set mortar beds up to 1/4 in (6 mm) thick.
  - 2. Material Quality Standard: ANSI A118.4, with the following physical properties:
    - a. Manufacturer's premium polymer modified thin-set product; gray color. Use white color with light colored stone, translucent marble or light color grout as recommended by manufacturer.
    - b. Integral antimicrobial product added during manufacturing to resist mold and mildew growth.
    - c. Non-sag capability.
  - 3. Manufacturers and Products - Floor Tiling:
    - a. Custom Building Products; Flexbond Fortified Thin-Set Mortar.
    - b. Laticrete International, Inc.; Laticrete 254 Platinum Thin-Set Mortar.
    - c. Mapei Corp.; Ultraflex 3 Mortar.
  - 4. Manufacturers and Products - Wall Tiling:
    - a. Custom Building Products; MagaLite Crack Prevention Mortar.
    - b. Laticrete International, Inc.; Laticrete 255 MultiMax Multipurpose Thin-Set Mortar.
    - c. Mapei Corp.; Ultralite Mortar.
- D. Latex-Portland Cement Sanded Grout:
- 1. Joint Width: For use for tile joints 1/8 in (3 mm) or wider.
  - 2. Material Quality Standard: ANSI A118.7, with following physical properties:
    - a. Manufacturer's premium polymer modified sanded grout product.
    - b. Integral antimicrobial product added during manufacturing to resist mold and mildew growth.
  - 3. Manufacturers and Products:
    - a. Custom Building Products; Prism Surecolor Grout.
    - b. Laticrete International, Inc.; 1500 Sanded Grout with 1776 Grout Enhancer.
    - c. Mapei Corp.; Ultracolor.
- E. Latex-Portland Cement Unsanded Grout:
- 1. Joint Width: For use for tile joints less than 1/8 in (3 mm) wide.
  - 2. Material Quality Standard: ANSI A118.7, with following physical properties:

- a. Manufacturer's premium polymer modified unsanded grout product.
  - b. Integral antimicrobial product added during manufacturing to resist mold and mildew growth.
- 3. Manufacturers and Products:
  - a. Custom Building Products; Prism Surecolor Grout.
  - b. Laticrete International, Inc.; 1600 Unsanded Grout with 1776 Grout Enhancer.
  - c. Mapei Corp.; Keracolor U.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer's written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
- B. Protect other work from dust generated by grinding operations. Control dust to prevent air pollution and comply with environmental protection regulations.

### **3.4 INSTALLATION OF PRECAST TERRAZZO**

- A. Install precast terrazzo units using method recommended by NTMA and manufacturer, unless otherwise indicated, and the following:
  - 1. Mortar: ANSI A108.5.
  - 2. Grout: ANSI A108.10.
- B. Installation Tolerance: Set units with alignment level and true to dimensions, varying 1/8 in (3 mm) maximum in length, height, or width; noncumulative.
- C. Do not install units that are chipped, cracked, discolored, or improperly finished.

- D. Seal joints between units with joint sealant in accordance with Division 07 Section "Joint Sealants".

### **3.5 CLEANING AND PROTECTING**

- A. Sealing:
  - 1. Seal surfaces according to NTMA's written recommendations.
  - 2. Apply sealer according to sealer manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure terrazzo is without damage or deterioration at time of Substantial Completion.

### **3.6 FINISH SCHEDULE:** as indicated in the Interior Finish Legend.

**END OF SECTION**

**17-13 OSU, College of Osteopathic Medicine at  
Cherokee Nation  
Childers Architect  
2019-07-26**

**PRECAST TERRAZZO FLOORING AT STAIRS**

**09 6603 - 8**

## **SECTION 09 6623**

### **THIN-SET TERRAZZO FLOORING**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Thin-set epoxy-resin terrazzo flooring products and systems and supplementary items necessary for installation.

##### **1.2 ALLOWANCES**

- A. Concrete Moisture Barrier Allowance: Include allowance to provide Concrete Moisture Barrier Floor Treatment to concrete floor decks.

##### **1.3 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Include the following:
  - 1. Divider, control-, and expansion-joint strips.
  - 2. Base and border strips.
  - 3. Abrasive strips.
  - 4. Stair treads, risers, and landings.
  - 5. Precast terrazzo jointing and edge configurations.
  - 6. Terrazzo patterns.
- C. Product Schedule: Use same designations indicated on the Finish Schedule and Drawings.
- D. Samples for Initial Selection: NTMA color plates showing the full range of colors and patterns available for each terrazzo type indicated.
- E. Samples for Verification Purposes: For each type, material, color, and pattern of terrazzo and accessory required showing the full range of color, texture, and pattern variations expected. Label each terrazzo sample to identify matrix color and aggregate types, sizes, and proportions. Prepare samples of same thickness and from same material to be used for the Work in size indicated below:
  - 1. Terrazzo: 12 in (300 mm) square samples.
  - 2. Accessories: 6 in (150 mm) long samples of each exposed strip item required.
  - 3. Precast Terrazzo: 6 in (150 mm) square samples.

#### **1.4 INFORMATIONAL SUBMITTALS**

- A. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
- B. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required.
- C. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.

#### **1.5 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: To include in maintenance manuals. Submit manufacturer's instructions for maintenance of installed work, including methods and frequency for maintaining optimum condition under anticipated use. Include precautions against cleaning materials and methods which may be detrimental to finishes and performance. Include product data for flooring care products used or recommended by installer and names, addresses, and telephone numbers of local sources for products.

#### **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Installer Qualifications:
  - 1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  - 2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
  - 3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.
  - 4. NTMA Membership: Installer shall be a contractor member of NTMA.
- C. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.
  - 1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.
    - a. Show typical components, attachments to building structure, and requirements of installation.
  - 2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.

3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

## **1.7 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.
  1. Participants:
    - a. Architect.
    - b. Contractor, including superintendent.
    - c. Installer, including project manager and supervisor.
    - d. If requested, Manufacturer's qualified technical representative.
    - e. Installers of other construction interfaced with Work.
  2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
    - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
    - b. Review Contract Document requirements.
    - c. Review approved submittals.
    - d. Review inspection and testing requirements.
    - e. Review environmental conditions and procedures for coping with unfavorable conditions.
    - f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
  3. Record discussions, including decisions and agreements, and prepare report.

## **1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials to project site in supplier's original wrappings and containers, labeled with source's or manufacturer's name, material or product brand name, and lot number, if any.
- B. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

## **1.9 PROJECT CONDITIONS**

- A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting terrazzo installation.
- B. Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during terrazzo installation.

- C. Close spaces to traffic during epoxy terrazzo application and for not less than 24 hours after application unless manufacturer recommends a longer period.
- D. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.
- E. Control and collect dust produced by grinding operations. Protect adjacent construction from detrimental effects of grinding operations.

#### **1.10 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
- B. Available Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those listed.
  1. Crossfield Products Corp., Dex-O-Tex Division; Cheminert Terrazzo.
  2. EnviroGLAS Products, Inc.; EnviroTRAZ.
  3. Key Resin Co.; Key Epoxy Terrazzo #108.
  4. Sherwin-Williams - General Polymers; Epoxy Terrazzo #1100 System.
  5. Sika Corporation; Sikafloor Terrazzo Resin.
  6. TEC Specialty Construction Brands, Inc.; Tuff-Lite Epoxy Terrazzo.
  7. Terrazzo & Marble Supply Co.; Terroxy Resin System.

#### **2.2 MATERIALS, GENERAL**

- A. Single Source Limitations for Aggregates: Obtain each color, grade, type, and variety of aggregate from one source with resources to provide materials of consistent quality in appearance and physical properties. Provide secondary materials only as recommended by manufacturer of primary materials.

#### **2.3 PERFORMANCE REQUIREMENTS**

- A. NTMA Standards: Comply with NTMA's "Terrazzo Specifications and Design Guide" and with written recommendations for terrazzo type indicated unless more stringent requirements are specified.
- B. Floor / Ceiling Assembly Sound Reduction Requirements: Sound isolation membranes shall contribute to achieving following ratings in floor / ceiling assemblies when tested by qualified independent testing agency acceptable to authorities having jurisdiction:

1. Impact Insulation (or Isolation) Class (IIC): Not less than 50 according to ASTM E 492 and ASTM E 989.

## **2.4 THIN-SET RESINOUS TERRAZZO MATERIALS**

- A. Flexible Reinforcing Membrane: Manufacturer's recommended resinous membrane for substrate crack preparation and reflective crack reduction.
- B. Sound Isolation and Flexible Reinforcing Membrane: Manufacturer's recommended resinous membrane for sound reduction and for substrate crack preparation and reflective crack reduction.
- C. Primer: Manufacturer's product recommended for substrate and use indicated.
- D. Epoxy Resin: Manufacturer's standard recommended for use indicated and in color required for mix indicated.

### **1. Physical Properties without Aggregates:**

- a. Hardness: 60 to 85 per ASTM D 2240, Shore D.
- b. Minimum Tensile Strength: 3000 psi (20.7 MPa) per ASTM D 638 for a 2 in (50 mm) specimen made using a "C" die per ASTM D 412.
- c. Minimum Compressive Strength: 10,000 psi (6.9 MPa) per ASTM D 695, Specimen B cylinder.
- d. Chemical Resistance: No deleterious effects by contaminants listed below after 7 day immersion at room temperature per ASTM D 1308.
  - 1) Distilled water.
  - 2) Mineral water.
  - 3) Isopropanol.
  - 4) Ethanol.
  - 5) 0.025 percent detergent solution.
  - 6) 1.0 percent soap solution.
  - 7) 10 percent sodium hydroxide.
  - 8) 10 percent hydrochloric acid.
  - 9) 30 percent sulfuric acid.
  - 10) 5 percent acetic acid.

### **2. Physical Properties with Aggregates: For resin blended with Georgia White marble, ground, grouted, and cured per requirements in NTMA's "Guide Specification for Epoxy Terrazzo," comply with the following:**

- a. Flammability: Self-extinguishing, maximum extent of burning 0.25 in (6.35 mm) per ASTM D 635.
- b. Thermal Coefficient of Linear Expansion: 0.0025 in/in per deg F (0.0025 mm/mm per 0.5556 deg C) for temperature range of minus 12 to 140 deg F (minus 24 to plus 60 deg C) per ASTM D 696.

- E. Aggregate: Complying with NTMA gradation standards for mix indicated and containing no deleterious or foreign matter.

1. Abrasion and Impact Resistance: Less than 40 percent loss per ASTM C 131.
2. 24-Hour Absorption Rate: Less than 0.75 percent.

3. Dust Content: Less than 1.0 percent by weight.
- F. Finishing Grout: Resin based.
- G. Terrazzo Mix: Comply with NTMA's "Terrazzo Specifications and Design Guide" and manufacturer's written instructions for matrix and marble-chip proportions and mixing.
1. Color and Pattern: As scheduled or as indicated in Design Selections.

## **2.5 STRIP MATERIALS**

- A. Heavy-Top Divider Strips: L-type angle, 3/8 in (10 mm) deep.
1. Bottom-Section Material: Match top section material.
  2. Top-Section Material: White zinc alloy.
  3. Top-Section Material: Half-hard brass.
  4. Top-Section Material: As scheduled or as indicated in Design Selections.
  5. Top-Section Width: 1/8 in (3 mm).
  6. Top-Section Width: 1/4 in (6 mm).
  7. Top-Section Width: 3/8 in (10 mm).
  8. Top-Section Width: As scheduled or as indicated in Design Selections.
- B. Control-Joint Strips: Separate, double L-type angles, positioned back to back, that match material, thickness, and color of divider strips and in depth required for topping thickness indicated.
- C. Accessory Strips: Match divider-strip width, material, and color unless otherwise indicated. Use the following types of accessory strips as required to provide a complete installation:
1. Base-bead strips for exposed top edge of terrazzo base.
  2. Edge-bead strips for exposed edges of terrazzo.
  3. Nosings for terrazzo stair treads and landings.
- D. Abrasive Strips for Stair Treads and Landings: Silicon carbide or aluminum oxide in epoxy-resin binder set in channel, 1/2 in (12 mm) wide by depth required by terrazzo thickness by 4 in (100 mm) less than stair width. Color as selected by Architect from manufacturer's full range.

## **2.6 ACCESSORY MATERIALS**

- A. Strip Adhesive: Epoxy-resin adhesive recommended by adhesive manufacturer for this use and acceptable to terrazzo manufacturer.
- B. Anchoring Devices:
1. Strips: Provide mechanical anchoring devices for strip materials as required for secure attachment to substrate.
  2. Precast Terrazzo: Provide mechanical anchoring devices as recommended by fabricator for proper anchorage and support of units for conditions of installation and support.
- C. Patching and Fill Material: Terrazzo manufacturer's resinous product approved and recommended by manufacturer for application indicated.

- D. Cleaner: Chemically neutral cleaner with pH factor between 7 and 10 that is biodegradable, phosphate free, and recommended by cleaner manufacturer for use on terrazzo type indicated.
- E. Seal Coat: Slip- and stain-resistant surface-type sealer that is chemically neutral with pH factor between 7 and 10; does not affect color or physical properties of terrazzo; is recommended by sealer manufacturer; and complies with NTMA's "Terrazzo Specifications and Design Guide" for terrazzo type indicated.
- F. Joint Sealants: As specified in Division 07 Section "Joint Sealants".

## **2.7 PRECAST EPOXY-RESIN TERRAZZO**

- A. Precast Terrazzo Base Units: Minimum 3/4 in (19 mm) thick, resinous terrazzo units cast in maximum lengths possible, but not less than 36 in (900 mm).
  - 1. Type: Coved with minimum 3/4 in (19 mm) radius.
  - 2. Type: Straight.
  - 3. Type: As indicated on drawings.
  - 4. Type: As scheduled or as indicated in Design Selections.
  - 5. Top Edge (Concealed): Straight, unfinished.
  - 6. Top Edge (Exposed): Beveled with polished top surface.
  - 7. Top Edge (Exposed): Radius edge with polished top surface.
  - 8. Top Edge (Exposed): As scheduled or as indicated in Design Selections.
  - 9. Metal Toe Strip for Coved-Toe Bases: Match divider strips.
  - 10. Outside Corner Units: With finished returned edges at outside corner.
  - 11. Color and Pattern: Match adjacent terrazzo flooring.
  - 12. Height: 4 in (100 mm).
  - 13. Height: 6 in (150 mm).
  - 14. Height: As indicated on drawings.
  - 15. Height: As scheduled or as indicated in Design Selections.
- B. Precast Terrazzo Units: Comply with NTMA's written recommendations for fabricating precast resinous terrazzo units in sizes and profiles indicated. Reinforce units as required by unit sizes, profiles, and thicknesses and as recommended by manufacturer.
  - 1. Color, Pattern, and Finish: Match adjacent terrazzo flooring.
  - 2. Stair Treads and Landings: Abrasive nosing strip and two-line abrasive inserts at nosings and tops of landings.
- C. Precast Terrazzo Finishing:
  - 1. Finish exposed-to-view edges or reveals to match face finish.
  - 2. Ease exposed edges to 1/8 in (3 mm) radius.

## **2.8 ELEVATOR CAR SUBSTRATE MATERIALS**

- A. Cementitious Backer Units:
  - 1. Material Quality Standard: ANSI A118.9 or ASTM C 1325.
  - 2. Description: Cementitious panels composed of portland cement, aggregates, glass mesh on both faces, and manufacturer's proprietary ingredients; capable of remaining unaffected by prolonged exposure to water; 1/4 in (6 mm) thick.
  - 3. Manufacturers and Products:

- a. Custom Building Products; WonderBoard.
  - b. FinPan, Inc.; Util-A-Crete Concrete Backer Board.
  - c. National Gypsum Properties LLC.; PermaBase Cement Board.
  - d. United States Gypsum Company (USG); DUROCK Interior Cement Board.
- B. Plywood: 3/4 in (19 mm) thick plywood complying with requirements of Division 06 Section "Miscellaneous Rough Carpentry".

## **2.9 CONCRETE MOISTURE BARRIER FLOOR TREATMENT**

- A. Epoxy-Based Moisture Barrier Floor Treatment: Two-component, high-performance, non-flammable, rapid drying, water based, low odor, low VOC, two-component, penetrating epoxy; formulated to reduce moisture vapor transmission and surface alkalinity from concrete substrates, including aged or freshly placed ("green") concrete, prior to installation of impervious glued-down finish flooring specified in other Division 09 sections.
  - 1. Basis of Design (Product Standard): Bostik, Inc.; D-250.
- B. Cementitious Overcoat: Fast-setting latex-fortified Portland cement skim coating intended for interior uses.
  - 1. Basis of Design (Product Standard): Bostik, Inc.; Webcrete 95.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer's written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

B. Concrete Substrates:

1. Verify that concrete substrates are dry and free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with terrazzo flooring. Determine adhesion and dryness characteristics by performing the following tests as recommended by terrazzo manufacturer.
  - a. Bead-blast concrete substrate with an apparatus that abrades the surface, contains the dispensed shot within the apparatus, and re-circulates the shot by vacuum pickup.
  - b. Repair damaged and deteriorated concrete according to terrazzo manufacturer's written recommendations.
  - c. Use patching and fill material to fill holes and depressions in substrates according to terrazzo manufacturer's written instructions.
2. Verify that concrete substrates are free of cracks, ridges, depressions, scale, and foreign deposits.
3. Moisture Testing: Perform one or both of the following tests as recommended by flooring manufacturer. Perform 3 moisture tests for first 1000 sf (92.9 sm) of concrete substrate scheduled to receive flooring and 1 test for each additional 1000 sf (92.9 sm) or fraction thereof. Proceed with installation only after concrete substrates pass testing.
  - a. Anhydrous Calcium Chloride Test: Perform in accordance with ASTM F 1869. Proceed with installation only after concrete substrates have maximum moisture-vapor-emission rate of 3 lbs of water/1000 sf (1.36 kg of water/92.9 sm) in 24 hours.
  - b. Relative Humidity Test: Using in situ probes, perform in accordance with ASTM F 2170. Proceed with installation only after concrete substrates have a maximum 80 percent relative humidity level measurement.
4. Moisture Barrier Floor Treatment: For concrete substrates not meeting moisture test standards specified above, apply epoxy-based moisture barrier floor treatment and cementitious overcoat to concrete substrate in accordance with manufacturer's written instructions.

- C. Protect other work from dust generated by grinding operations. Control dust to prevent air pollution and comply with environmental protection regulations.

### 3.4 INSTALLATION OF THIN-SET TERRAZZO

A. General:

1. Comply with NTMA's written recommendations for terrazzo and accessory installation.
2. Place, rough grind, grout, cure grout, fine grind, and finish terrazzo according to manufacturer's written instructions and NTMA's "Terrazzo Specifications and Design Guide".
3. Installation Tolerance: Limit variation in terrazzo surface from level to 1/4 in per 10 ft (6 mm per 3 m); noncumulative.
4. Ensure that matrix components and fluids from grinding operations do not stain terrazzo by reacting with divider and control-joint strips.
5. Delay fine grinding until heavy trade work is complete and construction traffic through area is restricted.

- B. Thin-Set Terrazzo Thickness: 3/8 in (10 mm).
- C. Flexible Reinforcing Membrane:
  - 1. Prepare and prefill substrate cracks with membrane material.
  - 2. Coverage:
    - a. Install membrane at substrate cracks in areas to receive terrazzo.
    - b. Install membrane to produce full substrate coverage in areas to receive terrazzo.
  - 3. Prepare membrane according to manufacturer's written instructions before applying substrate primer.
- D. Primer: Apply to terrazzo substrates according to manufacturer's written instructions.
  - 1. Strip Materials:
- E. Divider and Control-Joint Strips:
  - 1. Locate divider strips in locations indicated, but not to exceed 400 sf (37 sm).
  - 2. Install control-joint strips back to back directly above concrete-slab control joints and construction joints (cold joints).
  - 3. Install control-joint strips with 1/4 in (6 mm) gap between strips, and install sealant in gap.
  - 4. Install strips in adhesive setting bed without voids below strips, or mechanically anchor strips as required to attach strips to substrate, as recommended by strip manufacturer.
- F. Accessory Strips: Install as required to provide a complete installation.
- G. Fine Grinding: Grind with 120 or finer grit stones until all grout is removed from surface. Repeat rough grinding, grout coat, and fine grinding if large voids exist after initial fine grinding. Produce surface with a minimum of 70 percent aggregate exposure.
- H. Repair: Remove and replace terrazzo areas that evidence lack of bond with substrate. Cut out terrazzo areas in panels defined by strips and replace to match adjacent terrazzo, or repair panels according to NTMA's written recommendations, as accepted by Architect.

### **3.5 INSTALLATION OF PRECAST RESINOUS TERRAZZO**

- A. Install precast terrazzo units using method recommended by NTMA and manufacturer unless otherwise indicated.
- B. Installation Tolerance: Set units with alignment level and true to dimensions, varying 1/8 in (3 mm) maximum in length, height, or width; noncumulative.
- C. Do not install units that are chipped, cracked, discolored, or not properly finished.
- D. Seal joints between units with joint sealant in accordance with Division 07 Section "Joint Sealants".

### **3.6 INSTALLATION OF THIN-SET TERRAZZO AT ELEVATOR CAR**

- A. Substrate: Install cementitious backer unit over plywood. Maintain top surface elevation of cementitious backer unit substrate such that finish level of terrazzo is level with elevator cab door threshold.
- B. Flexible Reinforcing Membrane: Install membrane to produce full substrate coverage.
- C. Thin-Set Terrazzo Thickness: 3/8 in (10 mm).
- D. Perimeter Sealant Joint: Install 1/2 in (12 mm) sealant joint at elevator car perimeter complying with requirements of Division 07 Section "Joint Sealants".

### **3.7 CLEANING AND PROTECTION**

- A. Cleaning:
  - 1. Remove grinding dust from installation and adjacent areas.
  - 2. Wash surfaces with cleaner according to NTMA's written recommendations and manufacturer's written instructions; rinse surfaces with water and allow them to dry thoroughly.
- B. Sealing:
  - 1. Seal surfaces according to NTMA's written recommendations.
  - 2. Apply sealer according to sealer manufacturer's written instructions.
- C. Protection: Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure that terrazzo is without damage or deterioration at time of Substantial Completion.

### **3.8 FINISH SCHEDUL:** As indicated in the Interior Finish Legend.

**END OF SECTION**

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2019-07-26**

**THIN-SET TERRAZZO FLOORING**

**09 6623 - 12**

## **SECTION 09 6800**

### **CARPETING**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Carpeting products and systems and supplementary items necessary for installation.
- B. Resilient wall base and resilient molding accessories installed with carpeting are specified in Division 09 Section "Resilient Base and Accessories".

##### **1.2 ALLOWANCES**

- A. Concrete Moisture Barrier Allowance: Include allowance to provide Concrete Moisture Barrier Floor Treatment to concrete floor decks.

##### **1.3 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Provide floor plans, including columns, doorways, enclosing walls or partitions, built-in cabinets, and locations of cutouts, to indicate the following:
  - 1. Carpeting type and color.
  - 2. Type of substrate.
  - 3. Type of installation.
  - 4. Pattern type, location, and direction.
  - 5. Pile direction.
  - 6. Type, color, and location of insets and borders.
  - 7. Type, color, and location of edge, transition, and other accessory strips.
  - 8. Transition details to other flooring materials.
- C. Product Schedule: Use same designations indicated on the Finish Schedule and Drawings.
- D. Samples for Verification Purposes: In manufacturer's standard size, but not less than 6 in by 9 in (150 mm by 230 mm) sample of each different color, texture, and pattern of carpeting product specified, showing the full range of variations expected in these characteristics. Label each sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in Schedules.

##### **1.4 INFORMATIONAL SUBMITTALS**

- A. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.

- B. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required.
- C. Warranty: Sample of warranty.
  - 1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

## **1.5 CLOSEOUT SUBMITTALS**

- A. Maintenance Instructions: Include in operation and maintenance manual as required by Division 01 Section "Closeout Procedures". Submit manufacturer's instructions for maintenance of installed work, including methods and frequency for maintaining optimum condition under anticipated use. Include precautions against cleaning materials and methods which may be detrimental to finishes and performance.

## **1.6 MAINTENANCE MATERIAL SUBMITTALS**

- A. Extra Materials: Furnish the following extra materials that match and are from same production runs as products installed, packaged with protective covering for storage and identified with labels describing contents:
  - 1. Tile Carpeting: Furnish full-size units of tile carpeting equal to 5 percent of amount installed for each color and type indicated, but not less than 10 sq yd (8.4 sq m).

## **1.7 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Fire-Test-Response Characteristics: Provide products with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction.
  - 1. Critical Radiant Flux: Class I, 0.45 W/sq. cm or greater when tested per ASTM E 648.
  - 2. Smoke Density: Maximum specific optical density of 450 or less when tested per ASTM E 662.

## **1.8 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

## **1.9 DELIVERY, STORAGE, AND HANDLING**

- A. General: Comply with CRI 104, Section 5, "Storage and Handling".

## **1.10 PROJECT CONDITIONS**

- A. General: Comply with CRI 104, Section 6.1, "Site Conditions; Temperature and Humidity".
- B. Environmental Limitations: Do not install carpeting until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- C. Maintain carpeting products prior to installation at the same temperature as the space where they are to be installed.
- D. Close spaces to traffic during carpeting installation and for time period after installation recommended by manufacturer.
- E. Install carpeting products after other finishing operations, including painting, have been completed.
- F. Do not install carpeting over concrete substrates until slabs have cured and are sufficiently dry to bond with adhesive, as determined by carpeting manufacturer's recommended tests. Refer to "Preparation" Article for requirements.

## **1.11 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **1.12 WARRANTY**

- A. Manufacturer's Warranty for Carpeting: Furnish manufacturer's written material and labor warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design and installation of product. "Defects" is defined to include but not limited to deterioration or failure to perform as required.
  - 1. Coverage of warranty includes but is not limited to more than 10 percent edge raveling, snags, runs, dimensional stability, loss of tuft bind strength, loss of face fiber, and delamination.
  - 2. Warranty Period: Manufacturer shall warrant the products to be free from material and labor Defects for a period of 10 years from date of Substantial Completion.
- B. Warranty does not include deterioration or failure of carpeting due to unusual traffic, failure of substrate, vandalism, or abuse.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".

- B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

## **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.
- B. Emissions: Provide carpet that complies with testing and product requirements of CRI's "Green Label Plus" program.

## **2.3 TILE CARPETING**

- A. Basis of Design (Product Standard):
  - 1. Selections: As scheduled or as indicated in Interior Finish Legend on drawings.

## **2.4 ACCESSORY MATERIALS**

- A. Concrete Slab Primer: Non-staining type as recommended by carpeting manufacturer.
- B. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided by or recommended by carpeting manufacturer.
- C. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpeting and is recommended or provided by carpeting manufacturer.
  - 1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
    - a. Not more than 50 g/L.
- D. Concrete Moisture Barrier Floor Treatment:
  - 1. Epoxy-Based Moisture Barrier Floor Treatment: Two-component, high-performance, non-flammable, rapid drying, water based, low odor, low VOC, two-component, penetrating epoxy; formulated to reduce moisture vapor transmission and surface alkalinity from concrete substrates, including aged or freshly placed ("green") concrete, prior to installation of impervious glued-down finish flooring specified in other Division 09 sections.
    - a. Basis of Design (Product Standard): Bostik, Inc.; D-250.
  - 2. Cementitious Overcoat: Fast-setting latex-fortified Portland cement skim coating intended for interior uses.
    - a. Basis of Design (Product Standard): Bostik, Inc.; Webcrete 95.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
1. Respective manufacturer's written installation instructions.
  2. Accepted submittals.
  3. Contract Documents.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
- B. Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation" and carpeting manufacturer's written installation instructions for preparing substrates indicated to receive carpeting installation.
- C. Concrete Substrates: Prepare according to ASTM F 710.
1. Verify that concrete substrate finishes comply with requirements specified in Division 03 Section "Concrete Finishing" for concrete substrates receiving carpeting.
  2. Verify that concrete substrates are free of cracks, ridges, depressions, scale, and foreign deposits.
  3. Verify that concrete substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Unless concrete has been water-cured, then proceed with the following:
    - a. Shot-blast concrete substrate with an apparatus that abrades the surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
    - b. Repair damaged and deteriorated concrete according to flooring manufacturer's written recommendations.
  4. Determine adhesion and dryness characteristics by performing the following tests as recommended by flooring manufacturer.
  5. Alkalinity and Adhesion Testing: Perform tests recommended by flooring manufacturer. A pH range of 5 to 9 is required when substrate is wetted with distilled water and pHydron paper is applied. Proceed with installation only after concrete substrates pass testing.

6. Moisture Testing: Perform one or both of the following tests as recommended by flooring manufacturer. Perform 3 moisture tests for first 1000 sf (92.9 sm) of concrete substrate scheduled to receive flooring and 1 test for each additional 1000 sf (92.9 sm) or fraction thereof. Proceed with installation only after concrete substrates pass testing.
    - a. Perform anhydrous calcium chloride test in accordance with ASTM F 1869. Proceed with installation only after concrete substrates have maximum moisture-vapor-emission rate of 3 lbs of water/1000 sf (1.36 kg of water/92.9 sm) in 24 hours.
    - b. Perform relative humidity test using in situ probes in accordance with ASTM F 2170. Proceed with installation only after concrete substrates have a maximum 75 percent relative humidity level measurement.
  7. Moisture Barrier Floor Treatment: For concrete substrates not meeting moisture test standards specified above, apply epoxy-based moisture barrier treatment and cementitious overcoat to concrete substrate in accordance with manufacturer's written instructions.
- D. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.
- E. Broom and vacuum clean substrates to be covered immediately before installing carpeting. After cleaning, reexamine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.4 INSTALLATION OF CARPETING**

- A. Scribe, cut, and fit carpeting to butt neatly and tightly to vertical surfaces and permanent fixtures, including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.
- B. Extend carpeting into toe spaces, door reveals, closets, and similar openings. Extend carpeting to center of door openings.
- C. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish carpeting as marked on substrate. Use chalk or other nonpermanent, non-staining marking device.
- D. Do not bridge building expansion joints with carpet.
- E. Bind or seal cut edges as recommended by carpeting manufacturer.
- F. Install pattern parallel to walls and borders unless otherwise indicated.
- G. Hand-roll carpeting in both directions from center out to embed carpeting in adhesive and eliminate trapped air according to manufacturer's written instructions. At walls, door casings, and other locations where access by roller is impractical, press carpeting firmly in place with flat-bladed instrument.

### **3.5 INSTALLATION OF TILE CARPETING**

- A. Tile Carpet at Concrete Substrates: Comply with CRI 104, Section 13, "Carpet Modules (Tiles)" and carpet manufacturer's written recommendations for full glue-down installation of every tile with releasable adhesive.
- B. Install pattern parallel to walls and borders unless otherwise indicated.

### **3.6 INSTALLATION OF ADHERED SHEET CARPETING**

- A. Apply concrete slab primer, if recommended by carpeting manufacturer, prior to applying adhesive. Apply according to manufacturer's directions.
- B. Adhere to concrete substrates using a full spread of adhesive applied to substrate to comply with carpeting manufacturer's written instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times.
  - 1. Provide completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- C. Comply with carpeting manufacturer's written recommendations for seam locations and direction of carpeting; maintain uniformity of carpeting direction and lay of pile. At doorways, center seams under the door in closed position.

### **3.7 CLEANING AND PROTECTION**

- A. Perform the following operations immediately after installing carpeting:
  - 1. Remove excess adhesive and other surface blemishes from exposed surfaces using cleaner recommended by carpeting manufacturer.
  - 2. Remove yarns that protrude from carpeting surface.
  - 3. Vacuum carpeting using commercial machine with face-beater element.
- B. Protect installed carpeting to comply with CRI 104, Section 16, "Protecting Indoor Installations".
- C. Protect carpeting against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpeting manufacturer.

### **3.8 CARPETING SCHEDULE**

- A. Selections: As shown in interior Finish Legend on drawings.

**END OF SECTION**

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**CARPETING**

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**CARPETING**

**09 6800 - 9**

## **SECTION 09 7200**

### **WALL COVERINGS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Wall coverings and supplementary items necessary for installation.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, installation instructions, and recommendations for maintenance.
  - 2. Include data on physical characteristics, durability, fade resistance, and flame resistance characteristics.
- B. Shop Drawings: Show location and extent of each wall covering type. Indicate seams and termination points.
- C. Samples for Initial Selection: Manufacturer's color charts consisting of actual units or sections of units showing the full range of colors, textures, and patterns available.
- D. Samples for Verification Purposes: Sets for each color, texture, and pattern specified, showing the full range of variations expected in these characteristics.
  - 1. Full-width sample, not less than 36 in (900 mm) long, from dye lot used for the Work.
  - 2. Submit sample with specified treatments applied for products specified.
  - 3. Show complete pattern repeat where applicable.
- E. Product Schedule: Use same designations indicated on the Finish Schedule and Drawings.

##### **1.3 INFORMATIONAL SUBMITTALS**

- A. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
- B. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.

##### **1.4 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: To include in maintenance manuals.

## **1.5 MAINTENANCE MATERIAL SUBMITTALS**

- A. Extra Materials: Furnish the following extra materials that match and are from same production runs as products installed, packaged with protective covering for storage and identified with labels describing contents:
  - 1. Wall-Covering Materials: For each type, full-size units equal to 5 percent of amount installed.

## **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Fire-Test-Response Characteristics: As determined by testing identical wall coverings applied with identical adhesives to substrates according to test method indicated below by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Surface-Burning Characteristics: As follows, per ASTM E 84:
    - a. Flame-Spread Index: 25 or less.
    - b. Smoke-Developed Index: 50 or less.
- C. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up to comply with the following requirements, using materials indicated for the completed Work:
  - 1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.
    - a. Show typical components and requirements of installation.
  - 2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
  - 3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
  - 4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
  - 5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

## **1.7 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

## **1.8 PROJECT CONDITIONS**

- A. Do not install wall coverings until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient temperature and humidity conditions are and will be continuously maintained at values near those indicated for final occupancy.

- B. Environmental Limitations: Do not deliver or install wall coverings until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
  - 1. Wood-Veneer Wall Coverings: Condition spaces for not less than 48 hours before installation.
- C. Lighting: Do not install wall covering until a lighting level of not less than 15 foot-candles (160 lux) is provided on the surfaces to receive wall covering.
- D. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by the wall covering manufacturer for full drying or curing.

## **1.9 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
- B. Available Manufacturers: Subject to compliance with requirements of Contract Documents as judged by the Architect, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those listed.
- C. Basis of Design (Product Standard): Contract Documents are based on product and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.
  - 1. Manufacturer and Product: As scheduled or as indicated in the Interior Finish Legend.

### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

### **2.3 WALL COVERING MATERIALS**

- A. Vinyl Wall Covering: Provide integrally pigmented, opaque virgin vinyl calendared film vinyl wall covering material treated with mildew and antimicrobial additives and laminated to suitable backing. Comply with FS CCC-W-408D, Type II (except where Type I is specifically scheduled), Class 1, and CFFA W-101-D.

1. Stain-Resistant: Provide material for toilet rooms wet walls with delustered clear polyvinyl fluoride film not less than 0.0005 in (1/2 mil) thick as top coating complying with FS L-P-1040, Type I, Grade B, Class 2 (DuPont "Tedlar"). Do not include weight of stain-resistant coating as part of required vinyl coating weight or total fabric weight.
- B. Textile Wall Coverings: Provide textile wall fabric affixed to suitable backing, and complying with requirements of ASTM F 793, Category III, Decorative with High Serviceability. Provide material which has been treated for stain and mildew resistance.
- C. Wallpaper: Provide printed wallpaper complying with requirements of ASTM F 793, Category I, Decorative Only.
- D. Wood Veneer Wall Covering:
  1. Species and Graining: Refer to Basis of Design (Product Standard) portion of this Specification.
  2. Matching and Numbering: Each sheet shall be architecturally matched and sheets numbered in sequence for perfect continuity on the wall (except Random or Staved grade).
  3. Finish: Factory applied using wall-covering manufacturer's standard stain and polyurethane system.
    - a. Colors: Match Architect's sample.

## **2.4 ACCESSORY ITEMS**

- A. Adhesive: Mildew-resistant, nonstaining, strippable adhesive, for use with specific wall covering and substrate application; as recommended in writing by wall-covering manufacturer.
  1. Adhesive shall have VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  2. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Wall Liner: Nonwoven, synthetic underlayment and adhesive as recommended by wall covering manufacturer.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:

1. Respective manufacturer/fabricator's written installation instructions.
2. Accepted submittals.
3. Contract Documents.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
- B. Acclimatize wall covering materials by removing them from packaging in the installation areas not less than 24 hours before installation.
- C. Comply with manufacturer's written instructions for surface preparation.
- D. Clean substrates of substances that could impair wall covering's bond, including mold, mildew, oil, grease, incompatible primers, and dirt. Prepare substrates to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, and defects.
  1. Prime new gypsum board with primer recommended by wall covering manufacturer.
- E. Remove hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.
- F. Wall Liner: Where recommended by wall covering manufacturer install wall liner to form smooth wrinkle-free surface for finished installation. Do not begin wall covering installation until wall liner has dried.

### **3.4 INSTALLATION OF WALL COVERINGS**

- A. Comply with wall coverings manufacturers' written installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
- B. Cut wall covering panels in roll number sequence. Change run numbers at partition breaks and corners only.
- C. Install wall covering with no gaps or overlaps, no lifted or curling edges, and no visible shrinkage. Install seams vertical and plumb at least 6 in (150 mm) from outside corners and 3 in (75 mm) from inside corners. No horizontal seams are permitted.
- D. Fully bond wall covering to substrate. Remove air bubbles, wrinkles, blisters, and other defects.
- E. Trim edges for color uniformity, pattern match, and tight closure at seams and edges. Butt seams without any overlay or spacing between strips.

### **3.5 CLEANING**

- A. Remove excess adhesive at finished seams, perimeter edges, and adjacent surfaces. Use cleaning methods recommended by the wall covering manufacturer.
- B. Replace strips that cannot be cleaned.

- C. Reinstall hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

**3.6 WALL COVERING SCHEDULE:** as indicated in the interior finish legend.

**END OF SECTION**

## **SECTION 09 8433**

### **ACOUSTICAL WALL PANELS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Work required for this section includes acoustical wall panels and supplementary items necessary to complete their installation.
- B. Refer to Division 9 "Fabric-Wrapped Panels" for custom-fabricated wall panels.
- C. Refer to Division 9 Section "Stretched-Fabric Wall Systems" for site-upholstered wall systems.
- D. Refer to Division 9 Section "Wall Coverings" for direct glued fabric wall covering.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for acoustical wall panels, including plans, elevations, sections, details, and attachments to other Work. Show orientation of fabric application, pattern matching, and seams.
- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors, textures, and patterns available for facing materials for each type of acoustical wall panel indicated. Include samples of installation devices and accessories.
- D. Samples for Verification: 8 in (200 mm) by 11 in (275 mm) units of each type of acoustical wall panel indicated; in sets for each color, texture, and pattern specified for facing materials, showing the full range of variations expected in these characteristics. Include samples of installation devices and accessories.

##### **1.3 INFORMATIONAL SUBMITTALS**

- A. Product Certificates: Signed by manufacturers of acoustical wall panels certifying that products furnished comply with requirements.
- B. Product Test Reports: From a qualified testing agency indicating acoustical wall panels comply with requirements, based on comprehensive testing of current products.

##### **1.4 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For acoustical wall panels and facings to include in maintenance manuals specified in Division 1.

## **1.5 MAINTENANCE MATERIAL SUBMITTALS**

- A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Acoustical Wall Panels: Full-size units equal to 2 percent of amount installed.

## **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: A firm experienced in manufacturing acoustical wall panels similar to those indicated for this Project and with a record of successful in-service performance.
- B. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
- C. Fire-Test-Response Characteristics: Provide acoustical wall panels with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify acoustical wall panels with appropriate markings of applicable testing and inspecting agency.
  - 1. Flame Spread: 25 or less.
  - 2. Smoke Developed: 450 or less.
- D. Mockup: Before installing acoustical wall panels, build mockup for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
  - 1. Build mockup in the location and of the size indicated or, if not indicated, a minimum of three panels.
  - 2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
  - 3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
  - 4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
  - 5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

## **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Protect acoustical wall panels from excessive moisture when shipping, storing, and handling. Deliver in unopened bundles and store in a dry place with adequate air circulation. Do not deliver material to building until wet-work, such as concrete and plaster, has been completed and cured to a condition of equilibrium. Protect panel edges from crushing and impact.

## **1.8 PROJECT CONDITIONS**

- A. Environmental Limitations: Do not install acoustical wall panels until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Air-Quality Limitations: Protect acoustical wall panels from exposure to airborne odors, such as tobacco smoke, and install panels under conditions free from odor contamination of ambient air.
- C. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

## **1.9 WARRANTY**

- A. Special Warranty: Written warranty, signed by manufacturer agreeing to repair or replace components of acoustical wall panel system that fail in performance, materials, or workmanship within specified warranty period. Failure in performance includes, but is not limited to, acoustical performance. Failure in materials includes, but is not limited to, sagging or distortion of facing or warping of core.
- B. Warranty Period: Two years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS, GENERAL**

- A. Source Limitations for Acoustical Wall Panels: Obtain acoustical wall panels from one source with resources to provide products of consistent quality in appearance and physical properties.

### **2.2 ACOUSTICAL WALL PANELS**

- A. Provide manufacturer's standard panel construction consisting of facing material laminated to front face, edges, and back border of dimensionally stable, rigid glass fiber board core; with edges chemically hardened to reinforce panel perimeter against warpage and damage.
  - 1. Panel Selection: Refer to Schedule at end of this Section.
  - 2. Panel Selection: Refer to Division 1 Section "Design Selections"
- B. Fabricate panels to sizes and configurations indicated; attach facing materials to cores to produce installed panels with visible surfaces fully covered and free from waves in fabric weave, wrinkles, sags, blisters, seams, adhesive, or other foreign matter.
  - 1. Fabricate back-mounted panels in factory to exact sizes required to fit wall surfaces, based on field measurements of completed substrates indicated to receive acoustical wall panels.
  - 2. Tailor corners and attach facing material so there are no seams or gathering of material.
  - 3. Where fabrics with directional or repeating patterns, or directional weave, are indicated, mark fabric top and attach fabric in same direction.
  - 4. Where fabric facings with seams are indicated, fabricate invisible seams and comply with Shop Drawings for location.

- C. Dimensional Tolerances of Finished Units: Plus or minus 1/16 in (1.5 mm) for width length, straightness, squareness, and thickness.
- D. Sound-Absorption Performance: Provide acoustical wall panels with minimum noise reduction coefficients indicated, as determined by testing per ASTM C 423 for mounting type specified under individual product requirements in the Acoustical Wall Panel Schedule.
- E. Panel Characteristics: Comply with requirements indicated in the Acoustical Wall Panel Schedule.
- F. Spline-Mounting Accessories: Manufacturer's standard concealed, extruded-aluminum or plastic connecting splines designed and fabricated for screw attachment to walls, with other moldings and trim for interior and exterior corners, leveling and base support, and as required. Provide panel manufacturer's standard factory-applied finish on exposed items in color as selected.
- G. Back-Mounting Accessories: Manufacturer's standard or recommended accessories for securely mounting panels, of type and size indicated, to substrates provided; and complying with the following requirements:
  - 1. Mechanically Mounted Edge-Reinforced Panels: Metal panel-clip and base-support bracket system consisting of two-part panel clips, with one part of each clip mechanically attached to back of panel and the other part to wall substrate, designed to support panels laterally; and base-support brackets designed to support full weight of panels; with both designed to allow for panel removal.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine substrates surfaces to receive acoustical wall panels and associated work and conditions under which work will be installed. Do not proceed with installation until unsatisfactory conditions have been corrected in a manner acceptable to installer. Starting work within a particular area will be construed as installer's acceptance of surface conditions.

### **3.2 INSTALLATION**

- A. Install acoustical wall panels in locations indicated with vertical surfaces and edges plumb, top edges level and in alignment with other panels, and scribed to fit adjoining work accurately at borders and at penetrations. Comply with panel manufacturer's written instructions for installation of panels using type of mounting accessories indicated or, if not indicated, as recommended by manufacturer.
- B. Construction Tolerances: As follows:
  - 1. Variation from Plumb and Level: Plus or minus 1/16 in (1.5 mm).
  - 2. Variation of Joints from Hairline: Not more than 1/16 in (1.5 mm).

### **3.3 CLEANING**

- A. Clip loose threads; remove pills and extraneous materials.

- B. Clean panels with fabric facing, on completion of installation, to remove dust and other foreign materials according to manufacturer's written instructions.
- C. Remove surplus materials, rubbish, and debris resulting from acoustical wall panel installation, on completion of the Work, and leave areas of installation in a neat and clean condition.

### **3.4 PROTECTION**

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure acoustical wall panels are without damage or deterioration at time of Substantial Completion.
- B. Replace panels that cannot be cleaned and repaired, before time of Substantial Completion.

### **3.5 ACOUSTICAL WALL PANEL SCHEDULE:** As scheduled in the Interior Finish Legend.

**END OF SECTION**

17-13 OSU, College of Osteopathic Medicine at  
Cherokee Nation  
Childers Architect  
2019-07-26

ACOUSTICAL WALL PANELS

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## SECTION 09 9100

### PAINTING

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes: Surface preparation and field painting of exposed interior items, exterior items and surfaces.
  - 1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
- B. Paint exposed surfaces, except where indicated that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.
  - 1. Painting includes field painting of exposed bare and covered pipes and ducts, hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.
- C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels, unless indicated otherwise.
  - 1. Prefinished items include the following factory-finished components:
    - a. Prefinished wood doors.
    - b. Acoustical materials.
    - c. Prefinished Architectural woodwork and cabinets.
    - d. Elevator equipment.
    - e. Finished mechanical and electrical equipment.
    - f. Light fixtures.
    - g. Distribution cabinets.
    - h. Baked enamel coated items.
    - i. Fluorocarbon coated items.
    - j. Integral colored plaster.
    - k. Integral colored PVC.
  - 2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
    - a. Foundation spaces.
    - b. Furred areas.
    - c. Ceiling plenums.
    - d. Utility tunnels.
    - e. Pipe spaces.
    - f. Duct shafts.
    - g. Elevator shafts.

3. Finished metal surfaces include the following:
    - a. Anodized aluminum.
    - b. Stainless steel.
    - c. Chromium plate.
    - d. Copper and copper alloys.
    - e. Bronze and brass.
  4. Operating parts include moving parts of operating equipment and the following:
    - a. Valve and damper operators.
    - b. Linkages.
    - c. Sensing devices.
    - d. Motor and fan shafts.
  5. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.
    - a. Embossed UL labels may be used and painted where acceptable to authority having jurisdiction
- D. Related Sections:
1. Division 09 Section "Gypsum Board Assemblies" for surface preparation of gypsum board assemblies.

## **1.2 DEFINITIONS**

- A. MPI Gloss Levels: MPI Gloss and Sheen Standard values are measured per ASTM D523, Method D and are as follows:
1. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees.
  2. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees.
  3. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees.
  4. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees.
  5. Gloss Level 5: 35 to 70 units at 60 degrees.
  6. Gloss Level 6: 70 to 85 units at 60 degrees.
  7. Gloss Level 7: More than 85 units at 60 degrees.
- B. Exterior Painting: Generally includes surfaces located in unconditioned spaces.
- C. Interior Painting: Generally includes surfaces located in conditioned spaces.

## **1.3 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
1. Include manufacturer's specifications for materials, finishes, installation instructions, and recommendations for maintenance.
- B. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
  2. Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat indicated.
1. Submit Samples on rigid backing, 8 in (200 mm) square.
  2. Step coats on Samples to show each coat required for system.
  3. Label each coat of each Sample.
  4. Label each Sample for location and application area.

#### **1.4 INFORMATIONAL SUBMITTALS**

- A. Manufacturers Project Acceptance Document: Certification that products are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that warranty will be issued.
1. Certifications by manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).

#### **1.5 MAINTENANCE MATERIAL SUBMITTALS**

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

#### **1.6 QUALITY ASSURANCE**

- A. MPI Standards:
1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
  2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" and "MPI Maintenance Repainting Manual" for products and paint systems indicated.
- B. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Install mockup in the location and of the size indicated or, if not indicated, as directed by Architect.
    - a. Architect will select one surface to represent surfaces and conditions for application of each paint system.
      - 1) Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).

- 2) Other Items: Architect will designate items or areas required.
  - 3) Demonstrate repair procedures for damaged surfaces.
- b. Apply samples, according to requirements for the completed Work, after permanent lighting and other environmental services have been activated. Provide required sheen, color, and texture on each surface.
  - c. Final approval of color selections will be based on benchmark samples.
    - 1) If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.
2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
  3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
  4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
  5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

#### **1.7 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

#### **1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
  1. Maintain containers in clean condition, free of foreign materials and residue.
  2. Remove rags and waste from storage areas daily.

#### **1.9 PROJECT CONDITIONS**

- A. Apply paints only when temperatures of surfaces to be painted and surrounding air are between minimum and maximum range recommended by manufacturer.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

#### **1.10 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
  - 1. Behr.
  - 2. Benjamin Moore & Co.
  - 3. Dunn-Edwards Corporation.
  - 4. Kelly-Moore Paints.
  - 5. PPG Paints.
  - 6. Pratt & Lambert Paints.
  - 7. Sherwin-Williams Company (The).
- B. Color and Gloss: As scheduled or as indicated in Interior Finish Legend on drawings.

### **2.2 PAINT, GENERAL**

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Source Limitations: Obtain block fillers and field applied primers for each coating system from the same manufacturer as the finish coats.
- C. Material Compatibility:
  - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to shop applicators to ensure use of compatible primers.

### **3.2 INSTALLATION**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform work according to the following, unless otherwise specified in this Section:
1. Respective manufacturer's written installation instructions.
  2. Approved submittals.
  3. Contract Documents.
  4. MPI Architectural Painting Specification Manual" or "MPI Maintenance Repainting Manual", as applicable.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations and specifications for cleaning and surface preparation. Surfaces shall have no defects or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
- B. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" and "MPI Maintenance Repainting Manual" applicable to substrates and paint systems indicated.
- C. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
  2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates, unless expressly permitted by authorities having jurisdiction for labels intended to be painted.
- D. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- E. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.
1. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.
- F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
1. Galvanized metal substrates shall not be chromate passivated. If galvanized metal is chromate passivated, provide surface preparation and primers recommended by manufacturer.
- G. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
  2. Sand surfaces that will be exposed to view, and dust off.
  3. Prime edges, ends, faces, undersides, and backsides of wood.
  4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- H. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.
- I. Plaster Substrates: Do not begin paint application until plaster is fully cured and dry.
- J. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

### **3.4 APPLICATION**

- A. Apply paints according to manufacturer's written instructions.
1. Use applicators and techniques suited for paint and substrate indicated.
  2. Paint surfaces behind movable items, equipment, and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items, equipment, or furniture with prime coat only.
  3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
  4. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
  5. The number of coats and film thickness required are the same regardless of application method.
  6. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
  7. Omit primer over metal surfaces that have been shop primed and touchup painted.
  8. Allow sufficient time between successive coats to permit proper drying.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat. Tint per manufacturer's technical data for each type of primer or undercoat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve total dry film thickness of the entire system as recommended by manufacturer.

### **3.5 MECHANICAL AND ELECTRICAL WORK PAINTING AND IDENTIFICATION**

- A. Painting of Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work to be done when exposed in the following locations:

1. Equipment Rooms.
2. Occupied Spaces.
3. Exterior Walls.
4. Roof Areas.

B. Equipment includes, but is not limited to, the following:

1. Uninsulated piping.
2. Pipe hangers and supports.
3. Tanks that do not have factory-applied final finishes.
4. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
5. Equipment that is indicated to have a factory-primed finish for field painting.

C. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces. Paint with a flat, nonspecular black paint.

D. Pipe Identification: Conform to requirements of ANSI/ASME A13.1 "Scheme for the Identification of Piping Systems".

### **3.6 FIRE AND SMOKE BARRIER IDENTIFICATION**

A. Fire and smoke resistant rated walls shall be effectively and permanently identified with signs, labels or stencils in a manner acceptable to authority having jurisdiction.

1. Identification shall be above decorative ceiling and in concealed spaces, on each segment of the wall and 6'-0" O.C. maximum on each side of wall.

### **3.7 CLEANING AND PROTECTION**

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.

E. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces to match approved samples.

### **3.8 EXTERIOR PAINTING SCHEDULE**

A. Concrete Substrates, Nontraffic Surfaces:

1. Latex Over Alkali-Resistant Primer System: MPI EXT 3.1A.

- a. Prime Coat: Primer, alkali resistant, water based, MPI #3; VOC 100 g/L max.

- b. Intermediate Coat: Exterior latex matching topcoat.
- c. Topcoat: Latex, exterior, flat (MPI Gloss Level 1), MPI #10; VOC 50 g/L max.
- d. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4), MPI #15; VOC 100 g/L max.
- e. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5), MPI #11; VOC 100 g/L max.
- f. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6), MPI #119; VOC 100 g/L max.

B. CMU Substrates:

1. Latex System: MPI EXT 4.2A.

- a. Prime Coat: Block filler, latex, interior/exterior, MPI #4; VOC 100g/L max.
- b. Intermediate Coat: Exterior latex matching topcoat.
- c. Topcoat: Latex, exterior, flat (MPI Gloss Level 1), MPI #10; VOC 50 g/L max.
- d. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4), MPI #15; VOC 100 g/L max.
- e. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5), MPI #11; VOC 100 g/L max.
- f. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6), MPI #119; VOC 100 g/L max.
- g. Gloss and Sheen: As scheduled or as indicated in Design Selections.

C. Stucco (Portland Cement Plaster) Substrates:

1. Latex over Alkali-Resistant, Water-Based Primer System: MPI EXT 9.1J.

- a. Prime Coat: Primer, alkali resistant, water based, MPI #3; VOC 100 g/L max.
- b. Intermediate Coat: Exterior latex matching topcoat.
- c. Topcoat: Latex, exterior, flat (MPI Gloss Level 1), MPI #10; VOC 50 g/L max.
- d. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4), MPI #15; VOC 100 g/L max.
- e. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5), MPI #11; VOC 100 g/L max.
- f. Topcoat: Latex, exterior, gloss (MPI Gloss Level 6), MPI #119; VOC 100 g/L max.
- g. Gloss and Sheen: As scheduled or as indicated in Design Selections.

D. Steel Substrates (Ferrous Metal):

1. Water-Based, Light-Industrial Coating System: MPI EXT 5.1M

- a. Prime Coat: Rust-inhibitive primer, (water based), primer, MPI #107, VOC 100 g/L max.
- b. Intermediate Coat: Water-based, light-industrial coating, matching topcoat.
- c. Topcoat: Light industrial coating, exterior, water based (MPI Gloss Level 3), MPI #161, VOC 100 g/L max.
- d. Topcoat: Light industrial coating, exterior, water based, semi-gloss (MPI Gloss Level 5), MPI #163, VOC 100 g/L max.
- e. Topcoat: Light industrial coating, exterior, water based, gloss (MPI Gloss Level 6), MPI #164, VOC 100 g/L max.
- f. Gloss and Sheen: As scheduled or as indicated in Design Selections.

E. Galvanized-Metal Substrates:

1. Water-Based, Light-Industrial Coating System: MPI EXT 5.3J.
  - a. Prime Coat: Waterborne galvanized-metal primer, MPI #134, VOC 100 g/L max.
  - b. Intermediate Coat: Water-based, light-industrial coating, matching topcoat.
  - c. Topcoat: Light industrial coating, exterior, water based (MPI Gloss Level 3), MPI #161, VOC 100 g/L max.
  - d. Topcoat: Light industrial coating, exterior, water based, semi-gloss (MPI Gloss Level 5), MPI #163, VOC 100 g/L max.
  - e. Topcoat: Light industrial coating, exterior, water based, gloss (MPI Gloss Level 6), MPI #164, VOC 100 g/L max.
  - f. Gloss and Sheen: As scheduled or as indicated in Design Selections.

### 3.9 INTERIOR PAINTING SCHEDULE

#### A. Steel Substrates:

1. Institutional Low-Odor/VOC Latex System: MPI INT 5.1S.
  - a. Prime Coat: Rust-inhibitive primer (water based), MPI #107, VOC 100 g/L max.
  - b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
  - c. Topcoat: Latex, interior, institutional low odor/VOC, flat (MPI Gloss Level 1), MPI #143, VOC 10 g/L max.
  - d. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 2), MPI #144, VOC 10 g/L max.
  - e. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 3), MPI #145, VOC 10 g/L max.
  - f. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 4), MPI #146, VOC 10 g/L max.
  - g. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (MPI Gloss Level 5), MPI #147, VOC 10 g/L max.
  - h. Topcoat: Latex, interior, institutional low odor/VOC, gloss (MPI Gloss Level 6), MPI #148, VOC 10 g/L max.
  - i. Gloss and Sheen: As scheduled or as indicated in Design Selections.

#### B. Galvanized-Metal Substrates:

1. Institutional Low-Odor/VOC Latex System: MPI INT 5.3N.
  - a. Prime Coat: Waterborne galvanized-metal primer, MPI #134, VOC 100 g/l max.
  - b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
  - c. Topcoat: Latex, interior, institutional low odor/VOC, flat (MPI Gloss Level 1), MPI #143, VOC 10 g/l max.
  - d. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 2), MPI #144, VOC 10 g/L max.
  - e. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 3), MPI #145, VOC 10 g/L max.
  - f. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 4), MPI #146, VOC 10 g/L max.
  - g. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (MPI Gloss Level 5), MPI #147, VOC 10 g/l max.
  - h. Topcoat: Latex, interior, institutional low odor/VOC, gloss (MPI Gloss Level 6), MPI #148, VOC 10 g/l max.
  - i. Gloss and Sheen: As scheduled or as indicated in Design Selections.

C. Wood Panel Substrates: Including painted plywood, medium-density fiberboard, hardboard.

1. Institutional Low-Odor/VOC Latex System: MPI INT 6.4T.

- a. Prime Coat: Interior latex-based wood primer, MPI #39, VOC 100 g/L max.
- b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
- c. Topcoat: Latex, interior, institutional low odor/VOC, flat (MPI Gloss Level 1), MPI #143, VOC 10 g/L max.
- d. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 2), MPI #144, VOC 10 g/L max.
- e. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 3), MPI #145, VOC 10 g/L max.
- f. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 4), MPI #146, VOC 10 g/L max.
- g. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (MPI Gloss Level 5), MPI #147, VOC 10 g/L max.
- h. Topcoat: Latex, interior, institutional low odor/VOC, gloss (MPI Gloss Level 6), MPI #148, VOC 10 g/L max.
- i. Gloss and Sheen: As scheduled or as indicated in Design Selections.

D. Gypsum Board and Plaster (Gypsum and Portland Cement) Substrates:

1. Institutional Low-Odor/VOC Latex System: MPI INT 9.2M.

- a. Prime Coat: Institutional low-odor/VOC primer/sealer, MPI 149, VOC 10 g/L max.
- b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
- c. Topcoat: Latex, interior, institutional low odor/VOC, flat (MPI Gloss Level 1), MPI #143, VOC 10 g/L max.
- d. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 2), MPI #144, VOC 10 g/L max.
- e. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 3), MPI #145, VOC 10 g/L max.
- f. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 4), MPI #146, VOC 10 g/L max.
- g. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (MPI Gloss Level 5), MPI #147, VOC 10 g/L max.
- h. Topcoat: Latex, interior, institutional low odor/VOC, gloss (MPI Gloss Level 6), MPI #148, VOC 10 g/L max.
- i. Gloss and Sheen: As scheduled or as indicated in Design Selections.
- j. Gloss and Sheen: As scheduled or as indicated in Design Selections.

E. Cotton or Canvas Insulation-Covering Substrates: Including pipe and duct coverings.

1. Institutional Low-Odor/VOC Latex System: MPI INT 10.1D.

- a. Prime Coat: Institutional low-odor/VOC primer/sealer, MPI #50, VOC 100 g/L max.
- b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
- c. Topcoat: Latex, interior, institutional low odor/VOC, flat (MPI Gloss Level 1), MPI #143, VOC 10 g/L max.
- d. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 2), MPI #144, VOC 10 g/L max.
- e. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 3), MPI #145, VOC 10 g/L max.

- f. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 4), MPI #146, VOC 10 g/L max.
- g. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (MPI Gloss Level 5), MPI #147, VOC 10 g/L max.
- h. Topcoat: Latex, interior, institutional low odor/VOC, gloss (MPI Gloss Level 6), MPI #148, VOC 10 g/L max.
- i. Gloss and Sheen: As scheduled or as indicated in Design Selections.

### **3.10 PAINTING FINISH SCHEDULE**

- A. See Interior Finish Legend on drawings.

**END OF SECTION**

**SECTION 09 9653**  
**ELASTOMERIC COATINGS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes: Elastomeric coatings and supplementary items necessary for installation.

**1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
  2. Include manufacturer's technical information and instructions for handling, storing, and applying each coating material proposed for use.
- B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of finish-coat material indicated.
1. After color selection, the Architect will return color chips indicating colors selected for surfaces to be coated.
- C. Samples for Verification Purposes: Of each color and material to be applied, with texture to simulate actual conditions, on representative samples of actual substrate.
1. Submit samples on same type of substrate as that to receive application, 8 in (200 mm) square.
  2. Step coats on samples to show each separate coat, including primers and block fillers as applicable. Use representative colors when preparing samples for review. Resubmit until required sheen, color, and texture are achieved.
  3. Provide a list of materials and applications for each coat of each sample. Label each sample for location and application.
- D. Product List: For each product indicated, including the following:
1. Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules.
  2. Manufacturer's recommended spreading rate for each separate coat, including primers and block fillers, for each type of substrate as applicable.

**1.3 INFORMATIONAL SUBMITTALS**

- A. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required and that a warranty will be issued.
- B. Qualification Data:

1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.

C. Warranty: Sample of warranty.

1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

#### **1.4 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: To include in maintenance manuals.

#### **1.5 MAINTENANCE MATERIAL SUBMITTALS**

- A. Extra Materials: Furnish extra elastomeric coating materials, from the same production run as the materials applied, in quantities described below. Package materials in unopened, factory-sealed containers for storage and identify with labels describing contents. Deliver extra materials to the Owner.

1. Quantity: Furnish the Owner with an additional 5 percent, but not less than 1 gal. (3.8 L) of each color applied.

#### **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 10 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.

B. Applicator Qualifications:

1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.

- C. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.

1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.
  - a. Show typical components, attachments to building structure, and requirements of installation.
2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.

5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

## **1.7 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.
  1. Participants:
    - a. Architect.
    - b. Contractor, including superintendent.
    - c. Installer, including project manager and supervisor.
    - d. If requested, Manufacturer's qualified technical representative.
    - e. Installers of other construction interfaced with Work.
  2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
    - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
    - b. Review Contract Document requirements.
    - c. Review approved submittals.
    - d. Review inspection and testing requirements.
    - e. Review environmental conditions and procedures for coping with unfavorable conditions.
    - f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
  3. Record discussions, including decisions and agreements, and prepare report.

## **1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
  1. Maintain containers in clean condition, free of foreign materials and residue.
  2. Remove rags and waste from storage areas daily.

## **1.9 PROJECT CONDITIONS**

- A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 90 deg F (10 and 32 deg C) unless otherwise permitted by manufacturer's written instructions.
- B. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F (-15 deg C) above the dew point; or to damp or wet surfaces.
  1. Allow wet surfaces to dry thoroughly and attain temperature and conditions recommended by manufacturer before starting or continuing coating operation.

- C. Do not apply elastomeric coatings over sealant joints.

#### **1.10 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

#### **1.11 WARRANTY**

- A. Manufacturer's Warranty: Furnish manufacturer's written material and labor warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design and installation of product. "Defects" is defined to include but not limited to deterioration or failure to perform as required and water penetration through the coating.
  - 1. Warranty Period: Manufacturer shall warrant the products to be free from material and labor Defects for a period of 5 years from date of Substantial Completion
- B. Applicator's Warranty: Furnish applicator's written workmanship warranty signed by an authorized representative using applicator's standard form agreeing to provide labor required to repair or replace work which exhibits workmanship defects. "Defects" is defined to include but not limited to deterioration or failure to perform as required and water penetration through the coating.
  - 1. Warranty Period: Applicator shall warrant the application to be free from workmanship Defects for a period of 2 years from date of Substantial Completion.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
  - 1. AkzoNobel, dba Glidden Professional (formerly ICI Paints); Decra-Flex Elastomeric Coating.
  - 2. BASF Building Systems; MasterProtect EL 750 (Formerly Thoro Thorolastic or Sonneborn Flexcoat).
  - 3. Benjamin Moore & Co.; Moorlastic.
  - 4. Euclid Chemical Company; Tamms Tammolastic.
  - 5. ICI Paints; Decra-Flex Elastomeric Coating.
  - 6. PPG Industries, Inc.; Pitt-Flex
  - 7. Sherwin-Williams Company; Sherlastic Elastomeric Coating.
  - 8. Sto Corporation; StoLastic.

#### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

- B. Material Compatibility: Provide elastomeric finish coat system materials and related accessory materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by elastomeric coating manufacturer based on testing and field experience.

1. For each material or coat, provide products and spreading rates recommended in writing by elastomeric coating manufacturer for use on substrate indicated.

## **2.3 PERFORMANCE REQUIREMENTS**

- A. Provide elastomeric coating systems with the following properties as determined by the test methods indicated:

1. Elongation at Break: Not less than 300 percent at 77 deg F (25 deg C) and not less than 50 percent at 0 deg F (-17.7 deg C) according to ASTM D 412.
2. Low-Temperature Flexibility: Passes a 1/8 in (3 mm) mandrel at -30 deg F (-34 deg C) according to ASTM D 522.
3. Moisture-Vapor Transmission: 10 to 12 perms according to ASTM E 96.
4. Wind-Driven Rain Resistance: Passes according to TT-C-555B.
5. Tensile Properties: Tensile strength of 220 psi (1.5 MPa) according to ASTM D 412.
6. Crack Bridging per PR EN 1062-7:
  - a. At -77 deg F (-60 deg C): 12 mils (0.3 microns).
  - b. At 32 deg F (0 deg C): 19.5 mils (0.5 microns).
  - c. At 73 deg F (23 deg C): 27 mils (0.7 microns).
7. Pull-Off Strength Adhesion: 210 psi (1.4 MPa) according to ASTM D 4541.
8. Minimum Solids Content by Volume: Not less than 50 percent according to ASTM D 5201.

## **2.4 ELASTOMERIC COATING SYSTEM**

- A. Description: High-build, water-based, 100% acrylic, pigmented elastomeric waterproof coating system, designed to bridge dynamic cracks and retain flexibility.

1. Elastomeric Finish Coats: Minimum two coats with a total dry film thickness per manufacturer's recommendation for condition of substrate.

- B. Colors and Textures: Provide the following colors and textures of the finished elastomeric coating system:

1. As scheduled or as indicated in Design Selections.

## **2.5 ACCESSORY MATERIALS**

- A. Provide the following related accessory materials necessary for complete installation of elastomeric coating system as recommended by elastomeric coating manufacturer for substrate conditions and application requirements.

- B. Crack Filler: Elastomeric coating manufacturer's recommended, factory-formulated crack filler or sealants, including crack filler primer, compatible with substrate and other materials indicated.

- C. Primer: Elastomeric coating manufacturer's recommended, factory-formulated, alkali-resistant primer compatible with substrate and other materials indicated.
- D. Concrete Unit Masonry Block Filler: Elastomeric coating manufacturer's recommended, factory-formulated, high-performance latex block filler compatible with substrate and other materials indicated.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.
- B. Begin coating only when moisture content of substrate is 12% or less when measured with an electronic moisture meter.
- C. Begin coating no sooner than 28 days after substrate is constructed and is visually dry on both sides.
- D. Substrates:
  - 1. New: Verify that substrate is within the range of alkalinity recommended by elastomeric coating manufacturer.
  - 2. Existing: Verify suitability of substrates including surface conditions and compatibility with existing finishes and primers.

### **3.2 APPLICATION, GENERAL**

- A. Application Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer's written application instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective application or would cause latent defects in Work.
- B. Remove items already installed that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating. After completing coating operations in each area, reinstall items removed, using workers skilled in trades involved.

- C. Cleaning: Before applying coatings or other surface treatments, clean substrates of substances that could impair bond of coating systems. Remove oil and grease before cleaning. Schedule cleaning and coating application so dust and other contaminants will not fall on wet, newly coated surfaces.
- D. Surface Preparation: Clean and prepare surfaces to be coated according to manufacturer's written instructions for the particular substrate conditions and as specified.
  - 1. Cementitious Surfaces: Prepare concrete, concrete masonry, stucco, and similar surfaces to receive elastomeric coatings. Remove efflorescence, chalk, dust, dirt, release agents, grease, oils, and similar conditions by water blasting followed by a clear water rinse.
    - a. Remove mildew and neutralize surfaces according to manufacturer's written recommendations before patching materials are applied.
    - b. Roughen as required to remove glaze. Use abrasive blast-cleaning methods if recommended by coating manufacturer.
    - c. If hardeners or sealers have been used to improve concrete curing, use mechanical methods for surface preparation.
    - d. Determine alkalinity and moisture content of surfaces to be coated by performing appropriate tests. Do not apply coatings over surfaces where moisture content exceeds that permitted in manufacturer's written instructions.
  - 2. Crack Repair: Fill cracks according to manufacturer's written recommendations before coating surfaces.
  - 3. Deep Hairline Cracks: Remove dust and dirt from around cracks. Remove mildew by sterilizing before filling. Apply manufacturer's recommended primer to cracks before patching. If shrinkage occurs after applying crack filler, apply additional filler material to cracks before initially applying elastomeric coatings.
    - a. Cracks up to 1/16 in (1.5 mm): Clean surface around cracks. Apply primer penetrating cracks as deeply as possible, overflowing crack 2 in (50 mm) on each side. When primer is dry, apply crack filler forced well into cracks. Smooth edges around cracks over primed area. Allow for shrinkage when applying.
    - b. Cracks up to 3/8 in (10 mm): Open cracks to 1/4 in to 3/8 in (6 mm to 10 mm) wide and 1/8 in (3 mm) deep. Clean cracks and surrounding area removing dust, dirt, and other impurities. Apply primer to obtain uniform coverage and spread approximately 2 in (50 mm) on each side of cracks. Fill cracks with manufacturer's recommended crack filler, and allow for shrinkage. If excessive shrinkage occurs, reapply crack filler.
- E. Material Preparation: Mix and prepare materials according to coating manufacturer's written instructions.
  - 1. Stir materials before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film that may form into material. Remove film and, if necessary, strain coating material before using.
  - 2. If manufacturer permits thinning, use only thinners recommended by manufacturer, and only within limits recommended by manufacturer.

### **3.4 APPLICATION OF ELASTOMERIC COATINGS**

- A. General: Apply elastomeric coatings to exposed surfaces indicated, according to manufacturer's written instructions.
- B. Labels: Do not paint over UL, FM, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.
- C. Coating: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
  - 1. The number of coats and film thickness required are the same regardless of application method.
  - 2. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer.
  - 3. If undercoats or other conditions show through final coat, apply additional coats until coating film is of uniform finish, color, and appearance.
  - 4. Ensure that surfaces, including edges, corners, and crevices receive a dry film thickness equivalent to that of flat surfaces.
  - 5. Allow sufficient time between successive coats to permit proper drying.
  - 6. Do not recoat surfaces where application of another coat would cause undercoat to lift or lose adhesion.
- D. Application Procedures: Apply elastomeric coatings by roller or spray according to manufacturer's written instructions.
  - 1. Rollers: Use professional-quality quick-release rollers of carpet, velvet back, or high-pile sheep's wool covers as recommended by the manufacturer for material and texture required.
  - 2. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for material and texture required.
  - 3. Minimum Coating Thickness: Apply each material no thinner than manufacturer's recommended spreading rate. Provide total dry film thickness as recommended by the manufacturer.
  - 4. Wherever spray application is used, apply each coat to provide adequate coverage. Do not double back with spray equipment, building up film thickness of 2 coats in 1 pass.
- E. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
- F. Prime Coats: If recommended by the manufacturer, apply primer to substrate being coated before applying finish coats. Apply at a rate to ensure complete coverage.
- G. Roller Application: Keep the cover wet at all times; do not dry roll. Work in sections. Lay on required amount of material, working material into grooves and rough areas; then level material, working it into surface.
- H. Spray Application: Use spray equipment for application only when permitted by manufacturer's written recommendations and authorities having jurisdiction. Wherever spray application is used, do not double back with spray equipment to build up film thickness of two coats in one pass.

- I. Completed Work: Match accepted samples for color, texture, and coverage. Remove, refinish, or recoat work not complying with specified requirements.

### **3.5 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.
  1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.

### **3.6 CLEANING**

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from the Project site.
- B. After completing coating work, clean glass and spattered surfaces. Remove spattered coatings by washing, scraping, or other methods, being careful not to scratch or damage adjacent finished surfaces.

### **3.7 PROTECTION**

- A. Protect work of other trades from damage whether being coated or not. Correct damage by cleaning, repairing, replacing, and recoating as approved by the Architect. Leave in an undamaged condition.
- B. Provide "Wet Paint" signs to protect newly coated finishes. Remove temporary protective wrappings provided by others to protect their work after completing coating operations.
- C. After construction activities of other trades are complete, touch up and restore damaged or defaced coated surfaces.

### **3.8 ELASTOMERIC COATING SCHEDULE**

- A. Color and Texture: As selected by Architect from full range of manufacturer's colors and textures

**END OF SECTION**



## **SECTION 09 9663**

### **TEXTURED ACRYLIC COATINGS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Textured acrylic coatings and supplementary items necessary for installation.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
  2. Include manufacturer's technical information and instructions for handling, storing, and applying each coating material proposed for use.
- B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of finish-coat material indicated.
1. After color selection, the Architect will return color chips indicating colors selected for surfaces to be coated.
- C. Samples for Verification Purposes: Of each color and material to be applied, with texture to simulate actual conditions, on representative samples of actual substrate.
1. Submit samples on same type of substrate as that to receive application, 8 in (200 mm) square.
  2. Step coats on samples to show each separate coat, including primers and block fillers as applicable. Use representative colors when preparing samples for review. Resubmit until required sheen, color, and texture are achieved.
  3. Provide a list of materials and applications for each coat of each sample. Label each sample for location and application.
- D. Product List: For each product indicated, including the following:
1. Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules.
  2. Manufacturer's recommended spreading rate for each separate coat, including primers and block fillers as applicable, for each type of substrate as applicable.

##### **1.3 INFORMATIONAL SUBMITTALS**

- A. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required and that a warranty will be issued.
- B. Qualification Data:

1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.

C. Warranty: Sample of warranty.

1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

#### **1.4 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: To include in maintenance manuals.

#### **1.5 MAINTENANCE MATERIAL SUBMITTALS**

- A. Extra Materials: Furnish extra textured acrylic coating materials, from the same production run as the materials applied, in quantities described below. Package materials in unopened, factory-sealed containers for storage and identify with labels describing contents. Deliver extra materials to the Owner.

1. Quantity: Furnish the Owner with an additional 5 percent, but not less than 1 gal. (3.8 L) of each color applied.

#### **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 10 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.

B. Applicator Qualifications:

1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.

- C. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.

1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.
  - a. Show typical components, attachments to building structure, and requirements of installation.
2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.

5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

## **1.7 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.
  1. Participants:
    - a. Architect.
    - b. Contractor, including superintendent.
    - c. Installer, including project manager and supervisor.
    - d. If requested, Manufacturer's qualified technical representative.
    - e. Installers of other construction interfaced with Work.
  2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
    - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
    - b. Review Contract Document requirements.
    - c. Review approved submittals.
    - d. Review inspection and testing requirements.
    - e. Review environmental conditions and procedures for coping with unfavorable conditions.
    - f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
  3. Record discussions, including decisions and agreements, and prepare report.

## **1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
  1. Maintain containers in clean condition, free of foreign materials and residue.
  2. Remove rags and waste from storage areas daily.

## **1.9 PROJECT CONDITIONS**

- A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 90 deg F (10 and 32 deg C) unless otherwise permitted by manufacturer's written instructions.
- B. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F (-15 deg C) above the dew point; or to damp or wet surfaces.
  1. Allow wet surfaces to dry thoroughly and attain temperature and conditions recommended by manufacturer before starting or continuing coating operation.

- C. Do not apply textured acrylic coatings over sealant joints.

#### **1.10 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

#### **1.11 WARRANTY**

- A. Manufacturer's Warranty: Furnish manufacturer's written material and labor warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design and installation of product. "Defects" is defined to include but not limited to deterioration or failure to perform as required and water penetration through the coating.
  - 1. Warranty Period: Manufacturer shall warrant the products to be free from material and labor Defects for a period of 5 years from date of Substantial Completion
- B. Applicator's Warranty: Furnish applicator's written workmanship warranty signed by an authorized representative using applicator's standard form agreeing to provide labor required to repair or replace work which exhibits workmanship defects. "Defects" is defined to include but not limited to deterioration or failure to perform as required and water penetration through the coating.
  - 1. Warranty Period: Applicator shall warrant the application to be free from workmanship Defects for a period of 2 years from date of Substantial Completion.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
  - 1. BASF Building Systems; MasterProtect HB 400 (Formerly Thoro Thorocoat Tex).
  - 2. Euclid Chemical Company; Tamms Tammscoat.
  - 3. PPG Industries, Inc.; Perma-Crete Texture Finishings
  - 4. Sherwin-Williams Company; UltraCrete Textured Masonry Topcoat.
  - 5. Textured Coatings of America, Inc.; Tex-Cote 600 Textured Coating.

#### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.
- B. Material Compatibility: Provide textured acrylic finish coat system materials and related accessory materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by textured acrylic coating manufacturer based on testing and field experience.

1. For each material or coat, provide products and spreading rates recommended in writing by textured acrylic coating manufacturer for use on substrate indicated.

## **2.3 PERFORMANCE REQUIREMENTS**

- A. Provide textured acrylic coating systems with the following properties as determined by the test methods indicated:
  1. Flexibility: No cracking per ASTM D 522, 1 in (25 mm) mandrel.
  2. Wind-Driven Rain Resistance: Passes according to TT-C-555B.
  3. Moisture-Vapor Transmission: 6 perms per ASTM E 96, Procedure A.
  4. Accelerated Weathering at 5,000 Hours: Passes per ASTM G 53.
  5. Salt Fog Resistance: Passes per ASTM B 117 at 300 hours.
  6. Heat Age Stability: Passes per Fed Standard 141 C #3019.1. 30 days at 140 deg F (60 deg C).
  7. Fungus Resistance: No growth per ASTM D3273.
  8. Minimum Solids Content by Volume: Not less than 50 percent according to ASTM D 5201.

## **2.4 TEXTURED ACRYLIC COATING SYSTEM**

- A. Description: High-build, water-based, 100% acrylic, pigmented elastomeric, waterproof coating system with graded aggregate according to texture selection.
  1. Textured Acrylic Finish Coats: Minimum two coats with a total dry film thickness per manufacturer's recommendation for condition of substrate.
- B. Colors and Textures: Provide the following colors and textures of the finished textured acrylic coating system:
  1. As scheduled or as indicated in Design Selections.

## **2.5 MODIFIED CEMENT WATERPROOFING**

- A. Modified Cement Waterproofing:
  1. Product Description: Proprietary prepackaged blend of dry cementitious and other ingredients for mixing with polymer admixture to produce a waterproof coating suitable for vertical applications behind Portland cement plaster; with following minimum physical properties:
    - a. Permeability: Minimum 12 perms according to ASTM E 96 / E 96M.
    - b. Salt Spray Resistance: No defect according to ASTM B 117.
    - c. Artificial Weathering: No failure after 5,000 hours according to ASTM G 26.
  2. Basis of Design: BASF; MasterSeal 581 with MasterEmaco A 660 (Formerly Thoroseal with Acryl 60).
  3. Manufacturers:
    - a. AQUAFIN, Inc.
    - b. BASF
    - c. Sika Corp., Inc.
    - d. Tamms Industries, Inc.

- e. Vandex International, Inc.

## **2.6 ACCESSORY MATERIALS**

- A. Provide the following related accessory materials necessary for complete installation of textured acrylic coating system as recommended by textured acrylic coating manufacturer for substrate conditions and application requirements.
- B. Crack Filler: Textured acrylic coating manufacturer's recommended, factory-formulated crack filler or sealants, including crack filler primer, compatible with substrate and other materials indicated.
- C. Primer: Textured acrylic coating manufacturer's recommended, factory-formulated, alkali-resistant primer compatible with substrate and other materials indicated.
- D. Concrete Unit Masonry Block Filler: Textured acrylic coating manufacturer's recommended, factory-formulated, high-performance latex block filler compatible with substrate and other materials indicated.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.
- B. Begin coating only when moisture content of substrate is 12% or less when measured with an electronic moisture meter.
- C. Begin coating no sooner than 28 days after substrate is constructed and is visually dry on both sides.
- D. Substrates:
  - 1. New: Verify that substrate is within the range of alkalinity recommended by textured acrylic coating manufacturer.
  - 2. Existing: Verify suitability of substrates including surface conditions and compatibility with existing finishes and primers.

### **3.2 APPLICATION, GENERAL**

- A. Application Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer's written application instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.

### 3.3 PREPARATION

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective application or would cause latent defects in Work.
- B. Remove items already installed that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating. After completing coating operations in each area, reinstall items removed, using workers skilled in trades involved.
- C. Cleaning: Before applying coatings or other surface treatments, clean substrates of substances that could impair bond of coating systems. Remove oil and grease before cleaning. Schedule cleaning and coating application so dust and other contaminants will not fall on wet, newly coated surfaces.
- D. Modified Cement Waterproofing
  - 1. Apply number of coats recommended by manufacturer, but not less than two, by method suitable for substrate.
  - 2. Allow sufficient time between coatings to eliminate possibility of cementitious substrate joints telegraphing.
  - 3. Allow sufficient time for curing before applying textured acrylic coating.
- E. Surface Preparation: Clean and prepare surfaces to be coated according to manufacturer's written instructions for the particular substrate conditions and as specified.
  - 1. Cementitious Surfaces: Prepare concrete, concrete masonry, stucco, and similar surfaces to receive textured acrylic coatings. Remove efflorescence, chalk, dust, dirt, release agents, grease, oils, and similar conditions by water blasting followed by a clear water rinse.
    - a. Remove mildew and neutralize surfaces according to manufacturer's written recommendations before patching materials are applied.
    - b. Roughen as required to remove glaze. Use abrasive blast-cleaning methods if recommended by coating manufacturer.
    - c. If hardeners or sealers have been used to improve concrete curing, use mechanical methods for surface preparation.
    - d. Determine alkalinity and moisture content of surfaces to be coated by performing appropriate tests. Do not apply coatings over surfaces where moisture content exceeds that permitted in manufacturer's written instructions.
  - 2. Crack Repair: Fill cracks according to manufacturer's written recommendations before coating surfaces.
  - 3. Deep Hairline Cracks: Remove dust and dirt from around cracks. Remove mildew by sterilizing before filling. Apply manufacturer's recommended primer to cracks before patching. If shrinkage occurs after applying crack filler, apply additional filler material to cracks before initially applying textured acrylic coatings.

- a. Cracks up to 1/16 in (1.5 mm): Clean surface around cracks. Apply primer penetrating cracks as deeply as possible, overflowing crack 2 in (50 mm) on each side. When primer is dry, apply crack filler forced well into cracks. Smooth edges around cracks over primed area. Allow for shrinkage when applying.
  - b. Cracks up to 3/8 in (10 mm): Open cracks to 1/4 in to 3/8 in (6 mm to 10 mm) wide and 1/8 in (3 mm) deep. Clean cracks and surrounding area removing dust, dirt, and other impurities. Apply primer to obtain uniform coverage and spread approximately 2 in (50 mm) on each side of cracks. Fill cracks with manufacturer's recommended crack filler, and allow for shrinkage. If excessive shrinkage occurs, reapply crack filler.
- F. Material Preparation: Mix and prepare materials according to coating manufacturer's written instructions.
  - 1. Stir materials before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film that may form into material. Remove film and, if necessary, strain coating material before using.
  - 2. If manufacturer permits thinning, use only thinners recommended by manufacturer, and only within limits recommended by manufacturer.

### **3.4 APPLICATION OF TEXTURED ACRYLIC COATINGS**

- A. General: Apply textured acrylic coatings to exposed surfaces indicated, according to manufacturer's written instructions.
- B. Labels: Do not paint over UL, FM, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.
- C. Coating: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
  - 1. The number of coats and film thickness required are the same regardless of application method.
  - 2. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer.
  - 3. If undercoats or other conditions show through final coat, apply additional coats until coating film is of uniform finish, color, and appearance.
  - 4. Ensure that surfaces, including edges, corners, and crevices receive a dry film thickness equivalent to that of flat surfaces.
  - 5. Allow sufficient time between successive coats to permit proper drying.
  - 6. Do not recoat surfaces where application of another coat would cause undercoat to lift or lose adhesion.
- D. Application Procedures: Apply textured acrylic coatings by roller or spray according to manufacturer's written instructions.
  - 1. Rollers: Use professional-quality quick-release rollers of carpet, velvet back, or high-pile sheep's wool covers as recommended by the manufacturer for material and texture required.
  - 2. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for material and texture required.

3. Minimum Coating Thickness: Apply each material no thinner than manufacturer's recommended spreading rate. Provide total dry film thickness as recommended by the manufacturer.
  4. Wherever spray application is used, apply each coat to provide adequate coverage. Do not double back with spray equipment, building up film thickness of 2 coats in 1 pass.
- E. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
  - F. Prime Coats: If recommended by the manufacturer, apply primer to substrate being coated before applying finish coats. Apply at a rate to ensure complete coverage.
  - G. Roller Application: Keep the cover wet at all times; do not dry roll. Work in sections. Lay on required amount of material, working material into grooves and rough areas; then level material, working it into surface.
  - H. Spray Application: Use spray equipment for application only when permitted by manufacturer's written recommendations and authorities having jurisdiction. Wherever spray application is used, do not double back with spray equipment to build up film thickness of two coats in one pass.
  - I. Completed Work: Match accepted samples for color, texture, and coverage. Remove, refinish, or recoat work not complying with specified requirements.

### **3.5 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.
1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.

### **3.6 CLEANING**

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from the Project site.
- B. After completing coating work, clean glass and spattered surfaces. Remove spattered coatings by washing, scraping, or other methods, being careful not to scratch or damage adjacent finished surfaces.

### **3.7 PROTECTION**

- A. Protect work of other trades from damage whether being coated or not. Correct damage by cleaning, repairing, replacing, and recoating as approved by the Architect. Leave in an undamaged condition.
- B. Provide "Wet Paint" signs to protect newly coated finishes. Remove temporary protective wrappings provided by others to protect their work after completing coating operations.

- C. After construction activities of other trades are complete, touch up and restore damaged or defaced coated surfaces.

### **3.8 TEXTURED ACRYLIC COATING SCHEDULE**

- A. Color and Texture: As selected by Architect from full range of manufacturer's colors and textures.

**END OF SECTION**

**SECTION 10 1100**  
**VISUAL DISPLAY BOARDS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Work for this section includes visual display surfaces and supplementary items necessary to complete their installation for the following:

1. Metal-framed markerboards.
2. Metal-framed tackboards.
3. Glass markerboards.

**1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.
- C. Samples for Initial Selection: For each type of visual display unit indicated, for units with factory-applied color finishes.
- D. Samples for Verification: For each type of visual display unit indicated.
1. Visual Display Panel: Not less than 8-1/2 by 11 inches (215 by 280 mm), with facing, core, and backing indicated for final Work. Include one panel for each type, color, and texture required.
  2. Trim: 6-inch- (150-mm-) long sections of each trim profile.
  3. Display Rail: 6-inch- (150-mm-) long section of each type.
  4. Accessories: Full-size Sample of each type of accessory.
- E. Product Schedule: For visual display boards. Use same designations indicated on Drawings.

**1.3 INFORMATIONAL SUBMITTALS**

- A. Product Test Reports for Vinyl-Fabric-Faced Tackboards: Based on evaluation of comprehensive tests performed by a qualified testing agency, for surface-burning characteristics of tackboards.
- B. Qualification Data:
1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
- C. Warranty: Sample of warranty.

1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

#### **1.4 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For visual display units to include in maintenance manuals.

#### **1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Fire-Test-Response Characteristics for Vinyl-Fabric-Faced Tackboards: Provide vinyl-fabric-faced tackboards with the following surface-burning characteristics as determined by testing assembled materials composed of facings and backings identical to those required in this Section per ASTM E 84 by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify vinyl-fabric-faced tackboards with appropriate markings of applicable testing and inspecting agency.
  1. Flame Spread: 25 or less (Class A).
  2. Smoke Developed: 10 or less.

#### **1.6 WARRANTY**

- A. Porcelain Enamel Warranty: Submit a written warranty executed by manufacturer agreeing to replace porcelain enamel boards that do not retain their original writing and erasing qualities, exhibit excessive fading of color, or exhibit crazing, cracking, or flaking for the lifetime of the original installation, provided the manufacturer's written instructions for handling, installation, protection, and maintenance have been followed.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
- B. Available Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those listed.
  1. ADP Lemco, Inc.
  2. Best-Rite Manufacturing.
  3. Claridge Products and Equipment, Inc.
  4. Ghent Manufacturing, Inc.
  5. Marsh Industries, Inc.; Visual Products Group.

## **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

## **2.3 MARKERBOARDS**

- A. Porcelain Enamel Panels: Balanced, high-pressure-laminated, porcelain enamel panels of 3-ply construction consisting of face sheet, core material, and backing.
1. Face Sheet: 0.024-inch (0.61-mm) enameling grade steel especially processed for temperatures used in coating porcelain on steel. Coat exposed face and edges with a 3-coat process consisting of primer, ground coat, and color cover coat. Coat concealed face with a 2-coat process consisting of primer and ground coat. Fuse cover and ground coats to steel at manufacturer's standard firing temperatures, but not less than 1200 deg F (649 deg C).
    - a. Markerboard Cover Coat: Provide manufacturer's standard, light-colored, special writing surface with gloss finish intended for use with erasable dry markers.
  2. Core: 3/8-inch- (9.5-mm-) thick, particleboard core material complying with requirements of ANSI A208.1, Grade 1-M-1.
  3. Backing Sheet: 0.015-inch- (0.38-mm-) thick, aluminum-sheet backing.
  4. Laminating Adhesive: Manufacturer's standard, moisture-resistant, thermoplastic-type adhesive.

## **2.4 TACKBOARDS**

- A. Natural-Cork Tackboards: Single-layer, 1/4-inch- (6.4-mm-) thick, seamless, compressed fine-grain, bulletin board quality, natural-cork sheet; face sanded for natural finish.
- B. Plastic-Impregnated Cork Tackboards: Seamless sheet, 1/4-inch- (6.4-mm-) thick, ground natural cork compressed with a resinous binder with washable vinyl finish and integral color throughout, laminated to burlap backing.
1. Color: As scheduled or as indicated in Design Selections.
- C. Vinyl-Fabric-Faced Tackboards: Mildew-resistant, washable vinyl fabric complying with FS CCC-W-408, Type II, weighing not less than 13 oz./sq. yd. (440 g/sq. m), laminated to 1/4-inch- (6.4-mm-) thick cork sheet. Provide fabric with a flame-spread rating of 25 or less when tested according to ASTM E 84.
1. Color: As scheduled or as indicated in Design Selections.
- D. Backing: Factory laminate cork face sheet under pressure to 1/4-inch- (6.4-mm-) thick hardboard backing.

## **2.5 GLASS MARKERBOARDS**

- A. Glass Markerboards: 1/4 inch (6 mm) tempered glass markerboard, with smooth polished edge and eased corners.

1. Clear Tempered Glass: ASTM C 1048, Kind FT, Condition A, Type I, Class 1, Quality Q3, with exposed edges seamed before tempering.
2. Mounting: Round, stainless-steel standoffs, holding glass approximately 1 inch (25 mm) from wall surface; mounted in notches in standoffs at top and bottom edges of markerboard.
3. Color and Surface: clear.
4. Marker Tray: Glass, supported by stainless-steel clips.
5. Sizes: as indicated on drawings.

## **2.6 ACCESSORIES**

- A. Metal Trim and Accessories: Fabricate frames and trim of not less than 0.062-inch- (1.57-mm-) thick, extruded-aluminum alloy, size and shape as indicated, to suit type of installation. Provide straight, single-length units. Keep joints to a minimum. Miter corners to a neat, hairline closure.
  1. Where size of visual display surfaces or other conditions require support in addition to normal trim, provide structural supports or modify trim as selected by Architect from manufacturer's standard structural support accessories to suit conditions indicated.
  2. Factory-Applied Trim: Manufacturer's standard narrow trim with no visible screws or exposed joints.
  3. Chalktray: Manufacturer's standard, continuous, solid, extrusion-type, aluminum chalktray with ribbed section and smoothly curved exposed ends for each chalkboard.
  4. Map Rail: Furnish map rail at top of each unit, complete with continuous cork display rail approximately 1 or 2 inches (25 or 50 mm) wide, integral with map rail and end stops at each end of map rail.

## **2.7 FABRICATION**

- A. Porcelain Enamel Boards: Laminate facing sheet and backing sheet to core material under pressure with manufacturer's recommended flexible, waterproof adhesive.
- B. Assembly: Provide factory-assembled units, unless field-assembled units are required.
  1. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, balanced around center of board, as acceptable to Architect.
  2. Provide manufacturer's standard vertical joint system between abutting sections of chalkboards.

## **2.8 FINISHES**

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.
- B. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.
- C. Aluminum Frame Finish: As scheduled or as indicated in Design Selections.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

### **3.4 INSTALLATION**

- A. Deliver factory-built visual display boards completely assembled in one piece without joints, where possible. If dimensions exceed panel size, provide 2 or more pieces of equal length as acceptable to Architect. When overall dimensions require delivery in separate units, prefit components at the factory, disassemble for delivery, and make final joints at the site. Use splines at joints to maintain surface alignment.
- B. Install units in locations and at mounting heights indicated and according to manufacturer's written instructions. Keep perimeter lines straight, plumb, and level. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.

### **3.5 CLEANING AND PROTECTION**

- A. Clean visual display boards according to manufacturer's written instructions. Attach one removable cleaning instructions label to visual display unit in each room.
- B. Touch up factory-applied finishes to restore damaged or soiled areas.
- C. Cover and protect visual display boards after installation and cleaning.

- 3.6 FINISH SCHEDULE:** As indicated in the Interior Finish Legend.

## **END OF SECTION**

17-13 OSU, College of Osteopathic Medicine at  
Cherokee Nation  
Childers Architect  
2019-07-26

VISUAL DISPLAY BOARDS

**SECTION 10 1400**  
**INTERIOR SIGNAGE**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Work required for this section includes code required signs, including ADA, and supplementary items necessary to complete their installation.

**1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, mounting heights, spacing, reinforcement, details of components and attachments to other work. Distinguish between shop and field-assembled work.
  - 1. Provide message list for each sign, including large-scale details of wording, lettering, and Braille layout.
- C. Samples for Initial Selection: For each type of sign material indicated that involves color selection.
- D. Samples for Verification: For each type of sign, include the following Samples to verify color selected:
  - 1. Panel Signs: Full-size Samples of each type of sign required.
  - 2. Dimensional Characters: Full-size Samples of each type of dimensional character (letter and number) required. Show character style, material, finish, and method of attachment.
  - 3. Approved samples will not be returned for installation into Project.

**1.3 INFORMATIONAL SUBMITTALS**

- A. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.

**1.4 QUALITY ASSURANCE**

- A. Manufacturer/Fabricator Qualifications: Manufacturer with experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Regulatory Requirements: Comply with code provisions as adopted by authorities having jurisdiction and with Americans with Disabilities Act (ADA) for the following:

1. Tactile and Braille Characters.
2. Typestyles.
3. Character Height.
4. Pictograms (Symbols).
5. Finish and Contrast.
6. Mounting Location and Height.

## **PART 2 - PRODUCTS**

### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".

1. ASI Sign Systems, Inc.
2. Best Manufacturing Company.
3. Mohawk Sign Systems.
4. Seton Identification Products
5. The Supersine Company.

### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

### **2.3 MATERIALS**

- A. Plastic Laminate: Provide melamine plastic laminate engraving stock with face and core plies in contrasting colors.
- B. Cast Acrylic Sheet: Provide cast (not extruded or continuous cast) methyl methacrylate monomer plastic sheet, in sizes and thicknesses indicated, with a minimum flexural strength of 16,000 psi when tested according to ASTM D 790, with a minimum allowable continuous service temperature of 176 deg F.
1. Colored Coatings: Use colored coatings, including inks and paints for copy and background colors, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and are nonfading for the application intended.
  2. Mounting Fasteners: Use concealed fasteners fabricated from materials that are not corrosive to the sign material and mounting surface.

### **2.4 FABRICATION**

- A. Unframed Panel Signs: Fabricate signs with edges mechanically and smoothly finished with square coat edge condition and square corner condition.
- B. Graphic Content and Style: Provide sign copy that complies with requirements indicated and ADA for size, style, spacing, content, mounting height and location, material, finishes, and colors of signage.

- C. Tactile and Braille Copy: Manufacturer's standard process for producing copy complying with ADA Accessibility Guidelines and ICC/ANSI A117.1. Text shall be accompanied by Grade 2 Braille. Produce precisely formed characters with square cut edges free from burrs and cut marks.
- D. Typical Sign Design:
- E. Material: Cast-acrylic sheet or Plastic laminate.
- F. Perimeter: Unframed.
- G. Copy: Tactile and Braille.
- H. Character Style: Helvetica.
- I. Text: As indicated in the Sign Schedule to identify location.
- J. Message: Fixed.
- K. Sizes: Minimum required to meet code and ADA requirements.
- L. Colors: As selected from manufacturer's standard colors.

## **2.5 FINISHES**

- A. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures or other characteristics related to appearance, provide color matches indicated, or if not indicated, as selected by the Architect from the manufacturer's standards.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

### 3.3 PREPARATION

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

### 3.4 INSTALLATION

- A. General: Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.
  - 1. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.
  - 2. Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 in (75 mm) of sign without encountering protruding objects or standing within swing of door.
- B. Wall-Mounted Panel Signs: Attach panel signs to wall surfaces using one method indicated below:
  - 1. Vinyl-Tape Mounting: Use double-sided foam tape to mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.
  - 2. Hook-and-Loop Tapes: Use hook-and-loop tapes to mount signs to smooth, nonporous surfaces.
  - 3. Magnetic Tape: Use magnetic tape to mount signs to smooth, nonporous surfaces.
  - 4. Silicone-Adhesive Mounting: Use liquid-silicone adhesive recommended in writing by sign manufacturer to attach signs to irregular, porous, or vinyl-covered surfaces. Use double-sided vinyl tape where recommended in writing by sign manufacturer to hold sign in place until adhesive has fully cured.

### 3.5 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

### 3.6 SCHEDULE OF SIGNS

- A. See drawings for plan locations, schedules, and elevations.
- B. Stairs:
  - 1. Provide a sign at each door to each stairway on each floor.
  - 2. Message:
    - a. Required wording for exiting as required by the local code authorities. **“STAIR WAY”**.
    - b. Braille message as required by ADA.
- C. Stairs To Roof:
  - 1. Provide a sign at each door on Level One to each stairway that goes to Roof.

2. Message: Required wording as required by the local code authorities. **“STAIRS GOES TO ROOF”**.

D. Inside Stairs:

1. Provide a sign at each door in stairways.
2. Message: As required by local code authorities.
  - a. Identify stair location.
  - b. Identify floor level.
  - c. Identify all floors served.
  - d. Identify stairway's upper terminus.
3. Braille message as required by ADA.

E. Elevator Lobbies:

1. Provide a sign at each elevator group on other than Level One.
2. Provide a sign at each elevator group on all levels.
  - a. Message:
    - 1) Required wording and diagram for exiting as required by the local code authorities.  
"IN CASE OF FIRE  
DO NOT USE ELEVATORS  
USE STAIRS"
    - 2) Graphic symbols that are appropriate, including Fire Evacuation Map.
    - 3) Braille message as required by ADA.
  - b. Mount above elevator call button.

F. Toilet Rooms:

1. Provide a sign at the door to each public toilet room.
2. Message:
  - a. **“MEN”** or **“WOMEN”** as appropriate for the room.
  - b. Graphic symbol that is appropriate for the room.
  - c. Symbol of accessibility.
  - d. Braille message as required by ADA.

G. Other Rooms:

1. Provide a sign at each door that leads into the following rooms:
2. **TELEPHONE ROOM**
3. **ELECTRICAL ROOM**
4. **JANITOR CLOSET**
5. **MECHANICAL ROOM**
6. **MAIN TELEPHONE ROOM**
7. **MAIN ELECTRICAL ROOM**
8. **FIRE PUMP ROOM**

- 9. **FIRE CONTROL ROOM**
- 10. **SERVICE ELEVATOR**
- 11. **ELEVATOR MACHINE ROOM**
- 12. Braille message as required by ADA.

**END OF SECTION**

## **SECTION 10 2113**

### **TOILET COMPARTMENTS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Work for this section includes standard, manufactured toilet compartments and supplementary items necessary to complete work required for their installation.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: For each type and style of toilet compartment and screen specified. Include details of construction relative to materials, fabrication, and installation. Include details of anchors, hardware, and fastenings.
- B. Shop Drawings: For fabrication and installation of toilet compartment and screen assemblies. Include plans, elevations, sections, details, and attachments to other work.
  - 1. Show locations of reinforcement and cutouts for compartment-mounted toilet accessories.
- C. Samples for Verification: Of each compartment or screen color and finish required, prepared on 6-inch- (150-mm-) square Samples of same thickness and material indicated for Work.

##### **1.3 QUALITY ASSURANCE**

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84, or another standard acceptable to authorities having jurisdiction, by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame-Spread Index: 25 or less.
  - 2. Smoke-Developed Index: 450 or less.
- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" for toilet compartments designated as accessible.

##### **1.4 PROJECT CONDITIONS**

- A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".

1. Plastic Laminate Units:
  - a. Accurate Partitions Corporation.
  - b. All American Metal Corp.
  - c. American Sanitary Partition Corporation.
  - d. Ampco, Inc.
  - e. Bobrick Washroom Equipment, Inc.
  - f. Flush Metal Partition Corp.
  - g. General Partitions Mfg. Corp.
  - h. Global Steel Products Corp.
  - i. Knickerbocker Partition Corporation.
  - j. Marlite.
  - k. Metpar Corp.
  - l. Sanymetal; a Crane Plumbing company.
2. Steel Units:
3. Stainless Steel Units:
  - a. Accurate Partitions Corporation.
  - b. All American Metal Corp.
  - c. American Sanitary Partition Corporation.
  - d. Ampco, Inc.
  - e. Bradley Corporation; Mills Partitions.
  - f. Flush Metal Partition Corp.
  - g. General Partitions Mfg. Corp.
  - h. Global Steel Products Corp.
  - i. Hadrian Manufacturing Inc.
  - j. Knickerbocker Partition Corporation.
  - k. Metpar Corp.
  - l. Sanymetal; a Crane Plumbing company.

### **2.2 MATERIALS**

- A. General: Provide materials that have been selected for surface flatness and smoothness. Exposed surfaces that exhibit pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections on finished units are unacceptable.
- B. Steel Sheets for Color-Coated Finish: Provide mill-phosphatized steel sheet that is leveled to stretcher-leveled flatness complying with the requirements of standards indicated below:
1. Electrolytically Zinc-Coated Steel Sheet: ASTM A 591 (ASTM A 591M), Class C, of the following minimum thicknesses:
    - a. Pilasters:

- 1) Overhead Braced Units: 0.0359 in (0.9 mm).
  - 2) Unbraced Units: 0.0478 in (1.2 mm).
- b. Panels and Screens: 0.0359 in (0.9 mm).
  - c. Doors: 0.0299 in (0.7 mm).
  - d. Tapping Reinforcement: 0.0747 in (1.9 mm).
- C. Stainless-Steel Sheet: ASTM A 666, Type 302 or 304, that is leveled to stretcher-leveled flatness, finished on exposed faces as indicated in the "Stainless-Steel Sheet Finishes" Article, and of the following minimum thicknesses:
1. Pilasters:
    - a. Overhead Braced Units: 0.0375 in (0.9 mm).
    - b. Unbraced Units: 0.0500 in (1.25 mm).
  2. Panels and Screens: 0.0375 in (0.9 mm).
  3. Doors: 0.0312 in (0.78 mm).
  4. Tapping Reinforcement: 0.0781 in (1.9 mm).
- D. Core Material for Metal-Faced Units: Manufacturer's standard sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of 1 in (25 mm) minimum for doors, panels, and screens and 1-1/4 in (32 mm) minimum for pilasters.
- E. Plastic Laminate: NEMA LD 3, GP-50, 0.050 in (1.25 mm) nominal thickness.
1. Colors: As scheduled or as indicated in Design Selections.
- F. Core Material for Plastic Laminate: ANSI 208.1, Type M-2 particleboard with 45-lb (20.4-kg) density in thicknesses required to provide minimum nominal thicknesses for components as follows:
1. Doors, Panels, and Screens: 1 in (25 mm).
  2. Pilasters: 1-1/4 in (32 mm).
- G. Pilaster Shoes and Sleeves (Caps): ASTM A 666, Type 302 or 304 stainless steel, not less than 0.0312 in (0.78 mm) thick and 3 in (75 mm) high, finished to match hardware.
- H. Stirrup Brackets: Manufacturer's standard Chrome-plated, nonferrous, case zinc alloy (zamac) or clear-anodized aluminum ear or U-brackets for attaching panels to walls and pilasters.
- I. Hardware and Accessories: Manufacturer's standard design, heavy-duty Chrome-plated, nonferrous, cast zinc alloy (zamac) or clear-anodized aluminum operating hardware and accessories.
- J. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match hardware, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use hot-dip galvanized or other rust-resistant, protective-coated steel.
1. Floor Mounted Units: Anchorages and fasteners in contact with or in close proximity to floor shall be stainless steel

## **2.3 FABRICATION**

- A. General: Provide standard doors, panels, screens, and pilasters fabricated for compartment system. Provide units with cutouts and drilled holes to receive compartment-mounted hardware, accessories, and grab bars.
- B. Metal-Faced Toilet Compartments and Screens: Pressure laminate seamless face sheets to core material and provide continuous, interlocking molding strip or lapped and formed edges. Seal corners by welding or clips. Grind exposed welds smooth. Provide internal reinforcement for compartment-mounted hardware, accessories, and grab bars, as indicated.
- C. Plastic-Laminate Compartments and Screens: Pressure laminate facing sheets to core material without splices or joints in facings or cores. Apply laminate to edges before broad surfaces to seal edges and prevent laminate from being pried loose. Seal exposed core material at cutouts to protect core from moisture.
- D. Floor-Anchored Compartments: Provide manufacturer's standard corrosion-resistant anchoring assemblies complete with threaded rods, lock washers, and leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.
- E. Ceiling-Hung Compartments: Provide manufacturer's standard corrosion-resistant anchoring assemblies complete with threaded rods, lock washers, and leveling adjustment nuts at pilasters for connection to structural support above finished ceiling. Provide assemblies that support pilasters from structure without transmitting load to finished ceiling. Provide sleeves (caps) at tops of pilasters to conceal anchorage.
- F. Floor-Anchored Screens: Provide pilasters and panels of same construction and finish as toilet compartments. Provide manufacturer's standard corrosion-resistant anchoring assemblies complete with threaded rods, lock washers, and leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.
- G. Doors: Unless otherwise indicated, provide 30 in (750 mm) wide clear opening in-swinging doors for standard toilet compartments and 36 in (900 mm) wide out-swinging doors with a minimum 32 in (800 mm) wide clear opening for compartments indicated to be accessible.
  - 1. Hinges: Manufacturer's standard self-closing type that can be adjusted to hold door open at any angle up to 90 degrees.
  - 2. Latch and Keeper: Manufacturer's standard surface-mounted latch unit with combination rubber-faced door strike and keeper designed for emergency access. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be accessible.
  - 3. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.
  - 4. Door Bumper: Manufacturer's standard rubber-tipped bumpers at out-swinging doors.
  - 5. Door Pull: Manufacturer's standard unit that complies with accessibility requirements of authorities having jurisdiction at out-swinging doors. Provide units on both sides of doors at compartments indicated to be accessible.

## **2.4 BAKED ENAMEL STEEL SHEET FINISHES**

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

- B. Color-Coated Finish: Provide manufacturer's standard baked finish complying with coating manufacturer's written instructions for pretreatment, application, baking, and minimum dry film thickness.

## **2.5 STAINLESS-STEEL SHEET FINISHES**

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.
  - 1. Remove or blend tool and die marks and stretch lines into finish.
  - 2. Grind and polish surfaces to produce uniform, directional textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- B. Finish: No. 4 bright, directional polish.
- C. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
- D. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer's written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.

### **3.3 INSTALLATION**

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, plumb, and level. Provide clearances of not more than 1/2 in (12 mm) between pilasters and panels and not more than 1 in (25 mm) between panels and walls. Secure units in position with manufacturer's recommended anchoring devices.
  - 1. Secure panels to walls and panels with not less than 2 stirrup brackets attached near top and bottom of panel. Locate wall brackets so holes for wall anchors occur in masonry or tile joints. Align brackets at pilasters with brackets at walls.

- B. Floor-Anchored Compartments: Set pilaster units with anchors penetrating not less than 2 in (50 mm) into structural floor, unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position.
- C. Ceiling-Hung Compartments: Secure pilasters to supporting structure and level, plumb, and tighten. Hang doors and adjust so bottoms of doors are level with bottoms of pilasters when doors are in closed position.
- D. Screens: Attach with anchoring devices according to manufacturer's written instructions and to suit supporting structure. Set units level and plumb and to resist lateral impact.

### **3.4 ADJUSTING AND CLEANING**

- A. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors and swing doors in entrance screens to return to fully closed position.
- B. Provide final protection and maintain conditions that ensure toilet compartments and screens are without damage or deterioration at the time of Substantial Completion.

### **3.5 FINISH SCHEDULE:** As per Interior Finish Legend.

- A. Steel Units - Baked Enamel Finish:
  - 1. Color Selection: As selected from manufacturer's standard colors and approved by the Architect

**END OF SECTION**



**SECTION 10 2115**  
**CUBICLE SPECIALTIES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Work required for this section includes cubicle specialties and supplementary items necessary to complete their installation.

**1.2 SUBMITTALS**

- A. Product Data: Submit manufacturer's specifications to evidence compliance with these specifications.
- B. Shop Drawings:
  - 1. Show details of the system, related construction and reflected layout of ceiling areas showing location of tracks in relation to other ceiling mounted items.
  - 2. Indicate materials, finishes, dimensions, thicknesses and/or gages of parts, reinforcement, where applicable, and anchorage including items of hardware and accessories necessary for complete installation.
- C. Samples for Verification: Full-size units of each type of the following products:
  - 1. Curtain Fabric: 12 in (300 mm) square swatch or larger Sample as required to show complete pattern repeat, from dye lot used for the Work, with specified treatments applied. Mark top and face of material.
  - 2. Curtain Track: Not less than 4 in (100 mm) long.
  - 3. Curtain Carrier: Full-size unit.
  - 4. IV Track: Not less than 4 in (100 mm) long.
  - 5. IV Hanger: Full-size unit.
- D. Cubicle Schedule: Use same room designations as indicated on Drawings.

**1.3 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For each product if specified to include in maintenance manuals specified in Division 01.

**1.4 MAINTENANCE MATERIAL SUBMITTALS**

- A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Curtain Carriers and Track End Caps: Full-size units equal to 3 percent of quantity installed for each size indicated, but not less than 10 units.
  - 2. Curtains: Full-size units equal to 10 percent of quantity installed, but not less than 2 units.

## **1.5 QUALITY ASSURANCE**

- A. Mockup: Build mockup to verify selections made under Sample submittals and to demonstrate aesthetic effects and qualities of materials and execution.
  - 1. Build mockup of typical cubicle, complete with tracks, IV hanger, and curtain if specified.
  - 2. Approved mockup may become part of the completed Work if undisturbed at time of Substantial Completion.

## **1.6 PROJECT CONDITIONS**

- A. Environmental Limitations: Do not install cubicle specialties until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
  - 1. C/S Cubicle Curtains.
  - 2. Imperial Fastener Company, Inc.
  - 3. InPro Corporation.
  - 4. A. R. Nelson Co.
  - 5. Salisbury Industries.

### **2.2 CURTAIN TRACKS**

- A. Extruded-Aluminum Track: Not less than 1-1/4 inches wide by 3/4 inch high, with minimum wall thickness of 0.058 inch.
  - 1. Curved Track: Factory fabricated 12-inch-radius bends.
  - 2. Finish: Baked enamel, acrylic, or epoxy, white color.
- B. Track Accessories: Fabricate splices, end caps, connectors, end stops, coupling and joining sleeves, wall flanges, brackets, ceiling clips, and other accessories from same material and with same finish as track.
- C. Curtain Carriers: Two nylon rollers and nylon axle with chrome-plated steel, stainless steel, or aluminum hook with nickel plated steel beaded chain curtain drop.

- D. Breakaway Curtain Carriers (Detention/Psychiatric): One-piece nylon breakaway curtain carriers designed to allow curtains to detach from tracks with a pulling force of no more than 22 lbf (98 N).
- E. Exposed Fasteners: Stainless steel.
- F. Concealed Fasteners: Hot-dip galvanized.

## **2.3 IV SUPPORT SYSTEMS**

- A. Extruded-Aluminum IV Track: Not less than 1-1/4 in (32 mm) wide by 3/4 in (19 mm) high; with minimum wall thickness of 0.058 in (1.47 mm).
  - 1. Curved Track: Factory fabricated 12 in (300 mm) radius bends.
  - 2. Finish: Baked enamel, acrylic, or epoxy, white color.
- B. IV Carriers: Four nylon rollers and steel or stainless-steel axles, with hanger loop fabricated from 1/4-inch- diameter stainless steel.
- C. Telescoping IV Hangers: 3/4 in (19 mm) stainless-steel main shaft and a 3/8 in (10 mm) stainless-steel inner shaft, vertically adjustable 16 in (400 mm); with 4 non folding 1/4 in (6 mm) stainless-steel arms with loops and a stainless-steel top loop to attach to carrier.

## **2.4 CURTAINS**

- A. Cubicle Curtain Fabric: Cubicle manufacturer's standard, as follows:
  - 1. Color: As selected by Architect from manufacturer's full range.
  - 2. Fiber Content: 100 percent polyester, inherently and permanently flame resistant.
- B. Cubicle Curtain Fabric: Subject to compliance with requirements, provide the following:
  - 1. Refer to Division 01 Section "Interior Design Selections":
- C. Shower Curtain Fabric: Subject to compliance with requirements, provide the following:
  - 1. Refer to Design Selections.
  - 2. Refer to Division 10 Section "Toilet Accessories".
- D. Mesh Top: No. 50 (1/2 inch) nylon mesh. Top 20 in (500 mm) of curtain.
  - 1. Color: As selected by Architect from manufacturer's full range.
- E. Curtain Grommets: Two-piece, rolled-edge, rustproof, nickel-plated brass; spaced not more than 6 in (150 mm) o.c.; machined into top hem.
- F. Curtain Tieback: Nickel-plated brass chain; one at each curtain termination.
- G. Fabrication: Fabricate curtains to comply with the following requirements:
  - 1. Width: Finished width of panel to be 3 in (75 mm) less than specified fabric width.

2. Length: Equal to floor-to-ceiling height minus depth of track and carrier at top, and minus 15 inch distance above finished floor at bottom.
3. Mesh Top: Top hem not less than 1 in (25 mm) and not more than 1-1/2 in (38 mm) wide, triple thickness, reinforced with integral web, and double lock stitched. Double lock stitch bottom of mesh directly to 1/2 in (12 mm) triple thickness, top hem of curtain fabric.
4. Bottom Hem: Not less than 1 inch and not more than 1-1/2 in (38 mm) wide, double thickness and double lock stitched.
5. Side Hems: Not less than 1 in (25 mm) and not more than 1-1/2 in (38 mm) wide, with double thickness and double lock stitch.
6. Vertical Seams: Not less than 1/2 in (12 mm) wide, double turned and double stitched.
7. Top Hem: Triple thickness with edges turned and stitched top and bottom.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, and other conditions affecting performance of work.
  1. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 INSTALLATION**

- A. General: Install tracks level and plumb, according to manufacturer's written instructions. Provide track fabricated from one continuous length up to 16 feet.
  1. Track Mounting:
    - a. Ceilings Heights 9'-0" and Less: Surface.
    - b. Ceilings Heights Greater than 9'-0": Suspended.
- B. Surface Track Mounting: Fasten surface-mounted tracks at intervals of not less than 24 in (600 mm). Fasten support at each splice and tangent point of each corner. Center fasteners in track to ensure unencumbered carrier operation. Mechanically fasten to suspended ceiling grid with screws.
- C. Suspended Track Mounting for High Ceilings: At ceiling heights greater than 9'-0" Install track with suspended supports at intervals of not more than 48 in (1200 mm). Fasten support at each splice and tangent point of each corner. Secure ends of track to wall with flanged fittings or brackets.
- D. Track Accessories: Install splices, end caps, connectors, end stops, coupling and joining sleeves, and other accessories as required for a secure and operational installation.
- E. IV Hangers: Unless otherwise indicated, install one IV hook on each IV track and hang one IV hanger.
- F. Curtain Carriers: Provide curtain carriers adequate for 6 in (150 mm) spacing along the full length of the curtain plus an additional carrier.
- G. Curtains: Hang curtains on each curtain track. Secure with curtain tieback.

1. Install number of curtain panel units necessary for length of track to ensure that the total length is not less than 10 percent longer than length of track.
2. Top corners of each curtain panel is to share one curtain carrier so that when leading curtain panel is pulled, then all panels are interlocked and move as one continuous curtain.

**END OF SECTION**



## **SECTION 10 2238**

### **OPERABLE PANEL PARTITIONS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Work required for this section includes operable panel partitions and supplementary items necessary to complete their installation.
  - 1. Operable partitions shall be furnished as shown on the drawings complete with track, jambs, hardware as required for attaching track and jambs to the building structure, and supplementary items required to provide a complete and properly functioning installation. Exact construction details shall provide specified acoustical and functional performance.
- B. Independent Testing Laboratory: This Section specifies testing and coordination for testing by Independent Testing Laboratory employed by Contractor and accepted by Architect.
  - 1. Cost of Testing Laboratory Services shall be paid for by Contractor.
  - 2. In event that system failures necessitate retesting, Contractor shall pay additional Testing Laboratory Service fees and any fees and expenses incurred by Owner and Architects as result of retesting.
  - 3. Contractor shall be liable for any failure of the work to meet test requirements without adjustment to Contract Sum or Contract Schedule.

##### **1.2 DELEGATED ENGINEERING REQUIREMENTS**

- A. Contract Documents Design Intent: Drawings and Specifications indicate design intent for products and systems and do not necessarily indicate or specify total Work required. Contract Documents shall not be construed as an engineered design; furnish and install all Work required for a complete installation.
- B. Delegated Engineering Responsibility: Contractor shall employ a qualified professional engineer to provide engineering for products and systems including attachment to building structure required to meet design intent of Contract Documents.
  - 1. Preparation of structural analysis data including engineering calculations, shop drawings and other submittals signed and sealed by the qualified professional engineer.
- C. Delegated Engineering Professional Qualifications: Professional engineer legally authorized to practice in jurisdiction where Project is located and experienced in providing engineering services of kind indicated for products and systems similar to this Project and has a record of successful in-service performance.
- D. Coordination of Work:

1. Product Variations: In the event of minor differences between products and systems of acceptable or available manufacturers, Contractor shall notify Architect of such differences and resolve conflicts in a timely manner. Failure of Contractor to provide notification shall be construed as acceptance of conditions indicated, and changes caused by minor differences between products and Contract Documents shall be included in the Work at no additional cost to Owner.
2. Allowable Adjustments: Minor dimension and profile adjustments may be made in interest of fabrication or erection methods or techniques or ability to satisfy design intent, provided design intent is maintained as determined by Architect. Proposed deviations shall include a detailed analysis of impact to adjacent substrates or other building systems, including related design or construction cost impacts. If accepted by Architect, deviations causing changes in materials, constructability, substrates, or conditions shall be included in the Work at no additional cost to Owner.

### **1.3 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
  2. Include data on acoustical performance, surface-burning characteristics, and durability.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.
  1. Show location and extent of operable panel partitions. Include plans, elevations, sections, details, numbered panel installation sequence, attachments to other construction, and accessories. Indicate dimensions; weights; conditions at openings and for storage; and required installation, storage, and operating clearances. Indicate location and installation requirements for hardware and track, and direction of travel.
    - a. Calculate requirements for supporting operable panel partitions and verify capacity of carriers and track components to support loads; indicate deflection limits for partition and adjacent construction.
  2. Wiring Diagrams: For power, signal, and control wiring.
- C. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
  1. Suspended ceiling components.
  2. Structural members to which suspension systems will be attached.
  3. Items penetrating finished ceiling, including the following:
    - a. Lighting fixtures.
    - b. HVAC ductwork, outlets, and inlets.
    - c. Speakers.
    - d. Sprinklers.
    - e. Smoke detectors.
    - f. Access panels.

- 4. Plenum fire and acoustical barriers.
- D. Setting Drawings: For embedded items and cutouts required in other work, including support beam punching template.
- E. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below and of same thickness and material indicated for the Work. If finishes involve normal color, pattern or texture variations, include sample sets showing the full range of variations expected.
  - 1. Panel Facing Material: Manufacturer's standard-size unit, not less than 3 inches (75 mm) square.
  - 2. Panel Edge Material: Not less than full width by 6 inches (150 mm) long.
  - 3. Hardware: Mechanically operated bottom seal operating device.

#### **1.4 INFORMATIONAL SUBMITTALS**

- A. Delegated Engineering Calculations: Informational submittal for products indicated to comply with design loads, include structural analysis data signed and sealed by the approved qualified engineer responsible for their preparation; test reports are not acceptable substitute for calculations.
- B. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by an approved qualified testing laboratory indicating that each product complies with requirements.
- C. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".
  - 1. After completion of installation, submit field sound transmission test data on installed work as specified hereinafter.
- D. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its products and systems are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.
- E. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
- F. Warranty: Sample of warranty.
  - 1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

#### **1.5 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: To include in maintenance manuals.

1. User Guide: Furnish Owner with three (3) copies of complete brochure including recommended maintenance procedures, spare parts list, operating instructions and name and address of nearest service agent.
2. Panel face finishes and finishes for exposed trim and accessories. Include precautions for cleaning materials and methods that could be detrimental to finishes and performance.
3. Seals, hardware, track, carriers, and other operating components.
4. Electric operator and controls.

#### **1.6 MAINTENANCE MATERIAL SUBMITTALS**

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  1. Panel-Face Finish Material: Furnish full-width in quantity to cover both sides of tallest two panels when installed.

#### **1.7 MAINTENANCE SERVICE**

- A. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance service by Installer. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operation. Provide parts and supplies as used in the manufacture and installation of original equipment.
  1. Perform maintenance, including emergency callback service, during normal working hours.
- B. Continuing Maintenance Proposal: Provide a continuing maintenance proposal from Installer to Owner in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

#### **1.8 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 10 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Installer Qualifications:
  1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
- C. Fire-Test-Response Characteristics: Provide operable panel partitions with the following fire-test-response characteristics, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1. Surface-Burning Characteristics: As follows, per ASTM E 84:
    - a. Flame Spread: 25 or less.
    - b. Smoke Developed: 450 or less.
  2. Fire Growth Contribution: Textile wall coverings complying with the acceptance criteria of local building code requirements.
- D. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.
1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.
    - a. Show typical components, attachments to building structure, and requirements of installation.
  2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
  3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
  4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
  5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

## **1.9 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site to comply with requirements of applicable Division 01 Sections.
1. Participants:
    - a. Architect.
    - b. Contractor, including superintendent.
    - c. Installer, including project manager and supervisor.
    - d. If requested, Manufacturer's qualified technical representative.
    - e. Installers of other construction interfaced with Work.
    - f. Contractor's Independent Testing Laboratory.
  2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
    - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
    - b. Review Contract Document requirements.
    - c. Review approved submittals.
    - d. Review inspection and testing requirements.
    - e. Review environmental conditions and procedures for coping with unfavorable conditions.

- f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
3. Record discussions, including decisions and agreements, and prepare report.

#### **1.10 PROJECT CONDITIONS**

- A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.
  1. Operable partition shall be installed to close across area with smooth floor surface, with variance less than or equal to 1/8 inch (3 mm).
  2. Preparation of opening shall conform to the criteria set forth per ASTM E557 Standard Practice for Architectural Application and Installation of Operable Partitions. Plenum barrier construction shall provide an STC rating greater than or equal to that of scheduled Operable Partitions.

#### **1.11 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

#### **1.12 WARRANTY**

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of operable panel partitions that fail in materials or workmanship within specified warranty period.
  1. Failures include, but are not limited to, the following:
    - a. Faulty operation of operable panel partitions.
    - b. Deterioration of metals, metal finishes, and other materials beyond normal use.
  2. Warranty Period: 2 years from date of Substantial Completion.
- B. Manufacturer's Warranty: Furnish manufacturer's written material and labor warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design and installation of product. "Defects" is defined to include but not limited to deterioration or failure to perform as required.
  1. Failures include, but are not limited to, the following:
    - a. Structural failures including, but not limited to, excessive deflection.
    - b. Faulty operation of operable panel partitions
    - c. Deterioration of metals, metal finishes and other materials beyond normal wear.
  2. Warranty Period: Manufacturer shall warrant the products to be free from material and labor Defects for the following period of years from date of issuance of The Certificate of Substantial Completion.
    - a. Panel Warranty Period:
      - 1) Base Bid: 2 years.

- 2) Alternate Bid: 10 years.
- b. Trolley and Mechanically Operated Retractable Seals: 10 years.
  - c. Track, Brackets, Switches and Curves: 10 years.
  - d. Fixed Horizontal Top Seals: Lifetime of installation
- C. Installer's Warranty: Furnish installer's written workmanship warranty signed by an authorized representative using installer's standard form agreeing to provide labor required to repair or replace work which exhibits workmanship defects. "Defects" is defined to include but not limited to deterioration or failure to perform as required.
  - 1. Warranty Period: Installer shall warrant the installation to be free from workmanship Defects for a period of 2 years from date of issuance of The Certificate of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
- B. Available Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those listed.
  - 1. Manufacturers and Products - Ballrooms:
    - a. Advanced Equipment Corporation; Alpha Series, Type U.
    - b. Hufcor Inc.; 641 Series, Track 11.
    - c. Modernfold Inc.; Encore Series, Track 14.
  - 2. Manufacturers and Products - Meeting Rooms:
    - a. Advanced Equipment Corporation; Alpha Series, Type T.
    - b. Hufcor Inc.; 631 Series, Track 11.
    - c. Modernfold Inc.; Encore Series, Track 14.
- C. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.
  - 1. Manufacturer and Product: Modernfold, Inc.; Encore Series

### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

## **2.3 PERFORMANCE REQUIREMENTS**

- A. General Performance: Engineer products and systems to withstand loads within limits of allowable working stresses of the materials involved under conditions indicated and without permanent deformation or failure of materials.
- B. Design Loads: Engineer to withstand design loads including but not limited to gravity, wind, seismic, and erection design loads and thermal movements established by authorities having jurisdiction, applicable local building codes, and as indicated.
  - 1. Structural Movement: Engineer to withstand movements of structure including, but not limited to, drift, twist, column shortening, long-term creep and deflection from uniformly distributed and concentrated live loads. Contractor shall obtain required design data and identify movements accommodated on submittal drawings.
    - a. Review partition loading with Architect to verify that allowable deflection of supporting structure will not restrict partition operation nor affect partition acoustics
  - 2. Deflection of Supporting Structure: Operable panel wall system shall be capable of withstanding building movements within the following limitations:
    - a. Total Deflection - Ballrooms: Not to exceed 1.5 inch (38 mm).
    - b. Total Deflection - Meeting Rooms: Not to exceed 0.75 inch (19 mm).
    - c. Total Deflection: Not to exceed 0.75 inch (19 mm).
- C. Acoustical Characteristics:
  - 1. Noise Isolation Class (NIC): Manufacturer shall submit results of Noise Isolation Class (NIC) tests conducted by an independent testing agency of the same type wall systems, and of similar height and width, in accordance with ASTM E336-90.
    - a. Single Partitions: Refer to schedule at end of this section.
  - 2. Sound Transmission Class (STC): Manufacturer shall submit Laboratory test data performed in accordance with ASTM E90 and E413.
    - a. Single Partitions: Refer to schedule at end of this section.
    - b. STC: Not less than 52.
- D. Dimensional Tolerances: Engineer products and systems to accommodate dimensional tolerances of framing members and adjacent construction.

## **2.4 MATERIALS**

- A. Steel Frame: Steel sheet, not less than 0.0598 inch (1.5 mm), 16 gage nominal specified thickness for uncoated steel.
- B. Aluminum Trim: Alloy and temper recommended by aluminum producer and finisher for type of use, corrosion resistance, and finish indicated; ASTM B 221 for extrusions; manufacturer's standard strengths and thicknesses for type of use.
- C. Steel Face/Liner Sheets: Tension-leveled steel sheet, not less than nominal specified thickness for uncoated steel.

## **2.5 OPERABLE PANEL PARTITIONS**

- A. Panel Construction: Provide top reinforcement as required to support panel from suspension components and provide reinforcement for hardware attachment. Fabricate panels with tight hairline joints and concealed fasteners. Fabricate panels so finished in-place partition is rigid; level; plumb; aligned, with tight joints and uniform appearance; and free of bow, warp, twist, deformation, and surface and finish irregularities.
  - 1. Panel Faces: Tension-leveled steel sheet, minimum 16 gage nominal thickness or 18 gage nominal thickness; with laminated gypsum backer panel.
- B. Dimensions: Fabricate operable panel partitions, from manufacturer's standard sizes, to form an assembled system of dimensions indicated on Drawings and verified by field measurements.
- C. Cap-Trimmed Edges: If applicable, protective aluminum top and bottom edge trim with tight hairline joints concealing edges of panel and finish facing. One of the following as selected by Architect:
  - 1. Anodized Finish: Manufacturer's standard clear anodized.
  - 2. Powder Coat Finish: Manufacturer's standard baked polymer thermosetting powder finish.
- D. Vertical Trimless Edges: Fabricate vertical exposed panel edges so finish facing wraps uninterrupted around panel, covering edge and resulting in an installed partition with facing visible on vertical panel edges, without trim, for minimal sightlines at panel-to-panel joints.
- E. Operable Panel Partition Characteristics:
  - 1. Each partition shall consist of panels of steel frame construction with internal glass fiber fill and sound barrier septum, as required, to achieve the specified design criteria. Panel construction shall be fabricated from formed steel with overlapped and welded corners for rigidity. Top channel shall be reinforced to support suspension system components.
  - 2. Individual panels shall have roll-formed steel wrapping around panel edge. Panel skins shall be lock formed and welded directly to the frame for unitized construction.
- F. Hardware: Manufacturer's standard as required to operate operable panel partition and accessories; with decorative, protective finish.
- G. Panel Thickness: As scheduled at the end of this section.

## **2.6 SEALS**

- A. General: Provide types of acoustical seals that produce operable panel partitions complying with acoustical performance requirements and the following:
  - 1. Seals made from materials and profiles that minimize sound leakage.
  - 2. Seals fitting tight at contact surfaces and sealing continuously between adjacent panels and between operable panel partition perimeter and adjacent surfaces, when operable panel partition is extended, closed, and in place.
- B. Vertical Seals: Deep-nesting, interlocking astragals mounted on each edge of panel, with continuous PVC acoustical seal.

- C. Horizontal Top Seals: Continuous contact extruded vinyl bulb shaped sweeps with pairs of non-contacting vinyl fingers or PVC-faced, mechanical, constant-force-contact seal exerting uniform constant pressure on track when extended, ensuring horizontal and vertical sealing and resisting panel movement.
- D. Horizontal Bottom Seals: PVC-faced, mechanical, retractable, constant-force-contact seal exerting uniform constant pressure on floor when extended, ensuring horizontal and vertical sealing and resisting panel movement.
  - 1. Mechanically Operated: Extension and retraction of bottom seal by operating handle or built-in operating mechanism, with operating range and required operating clearance between retracted seal and floor finish. Partition manufacturer shall confirm deflection requirements to confirm bottom seal operating clearance and requirements.
    - a. Horizontal Bottom Drop Seals: As scheduled at the end of this section.

## **2.7 FINISH FACING**

- A. General: Install finish facings that comply with indicated fire-test-response characteristics and that are factory applied to operable panel partitions with appropriate backing, using mildew-resistant nonstaining adhesive as recommended by facing manufacturer's written instructions.
  - 1. Apply one-piece, seamless facings free of air bubbles, wrinkles, blisters, and other defects, with edges tightly butted, and with invisible seams complying with Shop Drawings for location, and with no gaps or overlaps. Horizontal butted edges and seams are not permitted. Tightly secure and conceal raw and selvage edges of facing for finished appearance.
  - 2. Where facings with directional or repeating patterns or directional weave are indicated, mark facing top and attach facing in same direction.
  - 3. Match facing pattern 72 inches (1800 mm) above finished floor.
- B. Vinyl-Coated Fabric Wall Covering: Manufacturer's standard, mildew-resistant, washable, vinyl-coated fabric wall covering; complying with CFFA-W-101-D for type indicated; Class A.
  - 1. Antimicrobial Treatment: Additives capable of inhibiting growth of bacteria, fungi, and yeasts.

## **2.8 SUSPENSION SYSTEMS**

- A. Suspension Tracks: Steel tracks with steel running surfaces and adjustable steel hanger rods for overhead support, designed for type of operation, size, and weight of operable panel partition indicated. Size track to support partition operation and storage without damage to suspension system, operable panel partitions, or adjacent construction. Limit track deflection to no more than 0.10 inch (2.5 mm) between bracket supports. Provide a continuous system of track sections and accessories to accommodate configuration and layout indicated for partition operation and storage.
  - 1. Panel Guide: Aluminum; finished with factory-applied, decorative, protective finish.
  - 2. Head Closure Trim: As required for acoustical performance; with factory-applied, decorative, protective finish selected by Architect from manufacturer's full range.

- B. Carriers: Trolley system as required for configuration type, size, and weight of partition and for easy operation; with precision ground, sealed, ball-bearing, steel-tired wheels. Trolley shall be pre-programmed at the factory to allow automatic indexing of panels into pocket areas.
- C. Track Intersections, Switches, and Accessories: As required for type of operation, storage, track configuration, and layout indicated for operable panel partition and compatible with partition assembly specified. Fabricate track intersections and switches from steel with steel running surfaces. Track design will incorporate smooth switches and curves to accommodate pre-programmed automatic indexing trolleys.
- D. Aluminum Finish: Clear anodized, factory-applied, decorative finish, unless otherwise indicated.
- E. Steel Finish: Factory-applied, corrosion-resistant, protective coating, unless otherwise indicated.

## **2.9 ELECTRIC OPERATORS**

- A. General: Factory-assembled electric operation system of size and capacity recommended and provided by operable panel partition manufacturer for partition specified; with electric motor and factory-prewired motor controls, speed reducer, chain drive, control stations, control devices, and accessories required for operation. Include wiring from control stations to motor. Coordinate operator wiring requirements and electrical characteristics with building electrical system.
- B. Comply with NFPA 70.
- C. Control Equipment: Comply with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6.
- D. Motor Electrical Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, within installed environment, with indicated operating sequence, and without exceeding nameplate rating or considering service factor. Comply with NEMA MG 1.
- E. Control Stations: Two single-key-operated, constant-pressure control stations located remotely from each other on opposite sides and opposite ends of partition run. Wire in series to require simultaneous activation of both key stations to operate partition. Each three-position control station labeled "Open," "Close," and "Off." Furnish two keys per station.
- F. Obstruction-Detection Devices: Equip each motorized operable panel partition with indicated automatic safety sensor that causes operator to immediately stop and reverse direction.
  - 1. Sensor Edge: Contact-pressure-sensitive safety edge along partition's leading edge.
  - 2. Sensor Mat: Electrically operated, contact-weight-sensitive safety mat in storage pocket area.
- G. Limit Switches: Adjustable switches, interlocked with motor controls and set to automatically stop operable panel partition at fully extended and fully stacked positions.
- H. Emergency Release Mechanism: Quick disconnect-release of electric-motor drive system, permitting manual operation in event of operating failure.

- I. Electric Interlock: Equip each motorized operable panel partition with electric interlocks at locations indicated, to prevent operation of operable panel partition under the following conditions:
  1. On storage pocket door, to prevent operation if door is not in fully open position.
  2. On partitions at location of convergence by another partition, to prevent operation if merging partitions are in place.

## **2.10 ACCESSORIES**

- A. Storage Pocket Door: Full height at end of partition runs to conceal stacked partition; of same materials, finish, construction, thickness, and acoustical qualities as panels; complete with operating hardware. Hinges in finish to match other exposed hardware. Provide pocket door configuration that allows partition seal to back of pocket.
  1. Rim Lock: Deadlock to receive cylinder, to secure storage pocket door in closed position. See Division 08 section "Door Hardware" for lock cylinder and keying requirements.
- B. Pass Door; Single Leaf:
  1. Pass Door: Matching pass door same thickness and appearance as partition panels. ADA compliant pass door shall be trimless and equipped with lever latch and push bar for panic operation. Threshold will not be permitted.
  2. Closers: Concealed automatic door closures with full 180 degree opening range and hold open capability.
  3. Exit Signs: Self illuminated chemical exit signs.
  4. Panic Hardware: Recessed lever latch and recessed push bar. Surface mount push bar is not permitted. Push/pull knob or drop ring latch is not permitted.
  5. Hinges: SOSS invisible hinges. Barrel or piano hinges are not permitted.
  6. Trimless: Perimeter trim around door is not permitted. Splice in panel face at top of door is not permitted.
  7. Viewer: Recessed door viewer.
  8. Deadbolt Lock: Prepare door for lock cylinder.
  9. Seals: Operable seals in door and adjacent panel legs, operable from edge of panel and door. Face operated seals on door or panel leg are not permitted.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.
- B. Examine flooring, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of operable panel partitions.

1. The operable wall sub-contractor shall take responsibility for the ceiling/floor void barriers, interfaces with walls, etc and other associated constructions which may form possible significant noise flanking paths (if deemed necessary by the sub-contractor). These constructions shall be designed and installed such that the overall site sound separation performance requirements are met. The sub-contractor shall include the associated works within the sub-contract and/or approve the design and site installation of the associated constructions, prior to site level difference testing, sufficient for the sub-contractor to guarantee overall performance without doubt as to contractual responsibilities.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  1. Comply with ASTM E 557.
  2. Respective manufacturer's written installation instructions.
  3. Accepted submittals.
  4. Contract Documents.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

### **3.4 INSTALLATION OF OPERABLE PANEL PARTITIONS**

- A. Install operable panel partitions and accessories after other finishing operations, including painting, have been completed. Broken, cracked, chipped, deformed, or unmatched panels are not acceptable.
- B. Installation personnel, experienced in the erection of the particular operable wall system furnished, shall be closely supervised by technician employed directly by the partition manufacturer.

### **3.5 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.
  1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.

- B. Testing Laboratory Field Service: Contractor shall engage and pay an approved qualified independent testing laboratory to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense.
1. Upon completion of this portion of the work, and prior to its acceptance by the Owner, the partition shall be set up by the manufacturer and field sound tested. Test price shall be included in the bid price. Prior to testing the operable partitions, the Architect and the partition manufacturer's representative will examine flanking paths through the surrounding building construction to determine that they will not significantly affect the performance of the operable partitions. The manufacturer shall complete the test with the Owner's Representative in attendance and shall make partition adjustments as required.
  2. Light Leakage Testing: Illuminate one side of partition installation and observe vertical joints and top / bottom seals; adjust partitions to eliminate voids.
  3. Noise Isolation Class (NIC) Testing: Perform testing of installed operable panel partitions for noise isolation according to ASTM E 336, determined by ASTM E413, and rated for not less than NIC indicated. Adjust partitions to comply with requirements.
  4. Extent of Testing: Testing agency shall randomly select partition installation for testing.
  5. Repair or replace partitions where test results indicate partitions do not comply with requirements; retest partitions.
  6. Additional testing and inspections, at Contractor's expense, shall be performed to determine compliance with requirements.

### **3.6 ADJUSTING**

- A. Adjust operable panel partitions and pocket doors to operate smoothly, easily, and quietly, free from binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Lubricate hardware and other moving parts.
- B. Electric Operator: Adjust operable panel partitions, hardware, electric operator, and other moving parts to function smoothly, and lubricate as recommended by manufacturer.
- C. Storage Pocket Doors: Adjust storage pocket doors to operate smoothly and easily, without binding or warping.
- D. Pass Doors: Adjust pass doors to operate smoothly and easily, without binding or warping.

### **3.7 CLEANING AND PROTECTION**

- A. Clean soiled surfaces on completing installation of operable panel partitions, to remove dust, adhesives, and other foreign materials according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer that ensure operable panel partitions are without damage or deterioration at time of Substantial Completion.
- C. Replace panels that cannot be cleaned and repaired, in a manner accepted by Architect, before time of Substantial Completion.

### **3.8 DEMONSTRATION**

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain operable panel partitions.
  - 1. Test and adjust seals, hardware, carriers, tracks, and other operable components. Replace damaged or malfunctioning operable components.
  - 2. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment and schedules.
  - 3. Review data in maintenance manuals. Refer to Division 01 Section "Closeout Procedures".
- A. **OPERABLE PANEL PARTITION SCHEDULE:** See Interior Finish Legend on drawings.

**END OF SECTION**



## **SECTION 10 2613**

### **WALL AND CORNER GUARDS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Scope: Impact-resistant wall protection systems, wall and corner guards, and supplementary items necessary for installation.
- B. Related Section:
  - 1. Division 06 Section "Plastic (FRP) Panels" for non-impact resistant, glass-fiber reinforced (FRP) plastic panels.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, physical characteristics such as durability, resistance to fading, and flame resistance, construction details, installation instructions, and recommendations for maintenance
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work

##### **1.3 INFORMATIONAL SUBMITTALS**

- A. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.

##### **1.4 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: Include for each wall protection system component to include in maintenance manuals specified in Division 1. Include recommended methods and frequency for maintaining optimum condition of plastic covers under anticipated traffic and use conditions, and precautions against using cleaning materials and methods that may be detrimental to plastic finishes and performance.

##### **1.5 MAINTENANCE MATERIAL SUBMITTALS**

- A. Extra Materials: Furnish as described below packaged with protective covering and identified with labels describing contents.
  - 1. Full-size units of maximum length, including plastic cover and aluminum retainer, equal to 2 percent of each type, color, and texture of each type of unit installed, but not less than 2 units.

2. Accessory components from same production run as materials installed.

## **1.6 QUALITY ASSURANCE**

- A. Fire-Test-Response Characteristics: Provide wall protection system components with surface-burning characteristics indicated, as determined by testing identical materials according to ASTM E 84 by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify wall protection system components with appropriate markings of applicable testing and inspecting agency.
- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.

## **1.7 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.
  1. Participants:
    - a. Architect.
    - b. Contractor, including superintendent.
    - c. Installer, including project manager and supervisor.
    - d. If requested, Manufacturer's qualified technical representative.
    - e. Installers of other construction interfaced with Work.
  2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
    - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
    - b. Review Contract Document requirements.
    - c. Review approved submittals.
    - d. Review inspection and testing requirements.
    - e. Review environmental conditions and procedures for coping with unfavorable conditions.
    - f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
  3. Record discussions, including decisions and agreements, and prepare report.

## **1.8 PROJECT CONDITIONS**

- A. Environmental Limitations: Do not deliver or install impact-resistant wall protection units until building is enclosed and weatherproof, wet work is complete and dry, and HVAC system is operating and maintaining temperature at 70 deg F (21 deg C) for not less than 72 hours before beginning installation and for the remainder of the construction period.

## **1.9 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
1. Alpar Architectural Products.
  2. American Floor Products Co., Inc.
  3. Arden Architectural Specialties, Inc.
  4. Construction Specialties, Inc. (C/S Group)
  5. IPC Door and Wall Protection Systems; Division of InPro Corporation.
  6. Korogard Wall Protection Systems; a division of RJF International Corporation.
  7. Pawling Corporation.
  8. Tepromark International, Inc.
- B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers/fabricators offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

### **2.3 MATERIALS**

- A. PVC Plastic: ASTM D 1784, Class 1, textured, chemical- and stain-resistant, high-impact-resistant PVC or acrylic-modified vinyl plastic with integral color throughout; extruded and sheet material, thickness as indicated.
- B. Engineered PETG (Polyethylene Terephthalate Glycol) Material: Textured, chemical- and stain-resistant, high-impact-resistant co-polymer plastic with integral color throughout; PVC-free with no PBTs or BPA, extruded and sheet material, thickness as indicated.
1. Impact Resistance: Minimum 25.4 ft-lbf/in. (1356 J/m) of notch when tested according to ASTM D 256, Test Method A.
  2. Chemical and Stain Resistance: Tested according to ASTM D 543 or ASTM D 1308.
  3. Self-extinguishing when tested according to ASTM D 635.
  4. Flame-Spread Index: 25 or less.
  5. Smoke-Developed Index: 450 or less.
  6. Color and Texture: As scheduled or as indicated in Design Selections.
- C. Polycarbonate Plastic Sheet: ASTM D 6098, S-PC01, Class 1 or 2, abrasion resistant; with a minimum impact-resistance rating of 15 ft-lbf/in. (800 J/m) of notch when tested according to ASTM D 256, Test Method A.
- D. Aluminum Extrusions: Alloy and temper recommended by manufacturer for type of use and finish indicated, but with not less than strength and durability properties specified in ASTM B 221 (ASTM B 221M) for Alloy 6063-T5.

- E. Brass: ASTM B 249/B 249M for extruded shapes and ASTM B 36/B 36 M for sheet.
- F. Solid Wood: Clear hardwood lumber of species indicated, free of appearance defects, and selected for compatible grain and color.
- G. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.
- H. Adhesive: As recommended by impact-resistant plastic wall protection manufacturer and with a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

## **2.4 WALL AND CORNER GUARDS**

- A. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers/fabricators offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.

- 1. Manufacturers and Products: As scheduled or as indicated in Interior Finish Schedule.

## **2.5 PLASTIC / ALUMINUM RETAINER TYPE WALL GUARDS**

- A. Drawing Designations CR-1, CR-2, CR-3 and CR-4 - Surface-Mounted Crash Rail Type Wall Guards:

- 1. Description:

- a. Cover: Snap-on type, extruded plastic; nominal 0.078 in (1.98 mm) thick; continuous in profile indicated.
- b. Mounting Retainer: Continuous extruded aluminum retainer; nominal 0.062 in (1.57 mm) thick; with continuous rubber or vinyl bumper material horizontally in retainer.
- c. Accessories: Prefabricated, injection-molded matching end caps, inside and outside corners with concealed splices, mounting hardware and other accessories as required.

- 2. Product Standards:

- a. Drawing Designation CR-1: C/S Group; SCR-80M.
- b. Drawing Designation CR-2: C/S Group; SCR-64M.
- c. Drawing Designation CR-3: C/S Group; SCR-50M.
- d. Drawing Designation CR-4: C/S Group; SCR-40.

- B. Drawing Designation BG - Surface-Mounted Bumper Rail Type Wall Guards:

- 1. Description:

- a. Cover: Snap-on type, extruded plastic; nominal 0.078 in (1.98 mm) thick; continuous in profile indicated.
- b. Mounting Retainer: Continuous extruded aluminum retainer; nominal 0.072 in (1.83 mm) thick; with resilient cushion material between retainer and wall.

- c. Accessories: Prefabricated, injection-molded matching end caps, inside and outside corners with concealed splices, mounting hardware and other accessories as required.
- 2. Product Standard:
  - a. Drawing Designation BG: C/S Group; BG-30.
- C. Drawing Designation HR - Surface-Mounted Bumper Rail Type Handrails:
  - 1. Product Quality Standard: ANSI A117.1.
  - 2. Description:
    - a. Cover: Snap-on type, extruded plastic; nominal 0.078 in (1.98 mm) thick; continuous in profile indicated.
    - b. Retainer: Continuous extruded aluminum retainer; nominal 0.075 in (1.90 mm) thick; with continuous rubber or vinyl bumper material horizontally in retainer.
    - c. Mounting Bracket: Extended, prefabricated, injection-molded, plastic mounting brackets.
    - d. Accessories: Prefabricated, injection-molded matching end caps, inside and outside corners with concealed splices, mounting hardware and other accessories as required.
  - 3. Product Standard:
    - a. Drawing Designation HR: C/S Group; HRB-20.
- D. Drawing Designation BL - Surface-Mounted Bed Locators:
  - 1. Description:
    - a. Cover: Extruded, rigid plastic, nominal 0.078 in (1.98 mm) thick, in dimensions and profiles indicated.
    - b. Retainer: Continuous extruded aluminum retainer; nominal 0.072 in (1.83 mm) thick; with resilient cushion material between retainer and wall.
    - c. Accessories: Two matching prefabricated, injection-molded, plastic bed locator end caps and concealed splices, mounting hardware and other accessories as required.
  - 2. Product Standard:
    - a. Drawing Designation BL: C/S Group; BL-100.

## **2.6 PLASTIC / ALUMINUM RETAINER TYPE CORNER GUARDS**

- A. Drawing Designations CG-1, CG-2, CG-3, and CG-4 - Surface-Mounted Non-Fire Rated Corner Guards:
  - 1. Description:
    - a. Cover: Snap-on type, extruded plastic; nominal 0.078 in (1.98 mm) thick; continuous in profile indicated with 1/4 inch corner radius.

- b. Retainer: Continuous extruded aluminum retainer; nominal 0.070 in (1.78 mm) thick.
    - c. Accessories: Prefabricated, injection-molded matching top cap with concealed splices, mounting hardware and other accessories as required.
  - 2. Product Standards:
    - a. Drawing Designations CG-1 and CG-2: C/S Group; SM-20, full or partial height as indicated by drawing designation.
    - b. Drawing Designations CG-3 and CG-4: C/S Group; SM-20M, full or partial height as indicated by drawing designation.
- B. Drawing Designation CG-5 and CG-6 - Flush-Mounted Non-Fire-Rated Corner Guards:
- 1. Description:
    - a. Cover: Snap-on type, extruded plastic; nominal 0.078 in (1.98 mm) thick; continuous in profile indicated.
    - b. Retainer: Continuous extruded aluminum retainer; nominal 0.070 in (1.78 mm) thick.
    - c. Accessories: Mounting hardware and other accessories as required.
  - 2. Product Standards:
    - a. Drawing Designations CG-5 and CG-6: C/S Group; FS-20, full or partial height as indicated by drawing designation.
- C. Drawing Designations CG-7, CG-8, CG-9, and CG-10 - Flush-Mounted Fire-Rated Corner Guards:
- 1. Description:
    - a. Cover: Snap-on type, extruded plastic; nominal 0.078 in (1.98 mm) thick; continuous in profile indicated with 1/4 inch corner radius.
    - b. Retainer: Continuous extruded aluminum retainer; nominal 0.070 in (1.78 mm) thick.
    - c. Fire Barrier: Continuous intumescent board or blanket.
    - d. Accessories: Mounting hardware and other accessories as required.
  - 2. Product Standards:
    - a. Drawing Designations CG-7 and CG-8: C/S Group; FS-20R, full or partial height as indicated by drawing designation, one-hour fire-rating.
    - b. Drawing Designation CG-9 and CG-10: C/S Group; FS-20R, full or partial height as indicated by drawing designation, two-hour fire-rating.
- D. Drawing Designation CG-11, CG-12, CG-13 and CG-14 – Surface-Mounted Non-Fire-Rated Corner Guards:
- 1. Description: Fabricated from 0.060 in (1.52 mm) thick extruded plastic sheet; wings size as indicated; with formed edges and 90 degree corner.
  - 2. Mounting Method: Adhesive and chrome plated metal screws.
  - 3. Product Standard:

- a. Drawing Designations CG-11 and CG-12: C/S Group; TFC with 2 in x 2 in (50 by 50 mm) wings, full or partial height as indicated by drawing designation.
  - b. Drawing Designations CG-13 and CG-14: C/S Group; TFC with 3-1/2 in x 3-1/2 in (87 by 87 mm) wings, full or partial height as indicated by drawing designation.
- E. Drawing Designations CG-15 - Flush-Mounted Non-Fire-Rated End-of-Wall Corner Guards:
  - 1. Description:
    - a. Cover: Snap-on type, extruded plastic; nominal 0.078 in (1.98 mm) thick; continuous in profile indicated with 1/4 inch corner radius.
    - b. Retainer: Continuous extruded aluminum retainer; nominal 0.062 in (1.57 mm) thick.
    - c. Accessories: Mounting hardware and other accessories as required.
  - 2. Product Standard:
    - a. Drawing Designation CG-15: C/S Group; FSC-25.
- F. Drawing Designations CG-16 - Surface-Mounted Non-Fire Rated End-of-Wall Corner Guards With Wall Protection Inset:
  - 1. Description:
    - a. Cover: Snap-on type, extruded plastic; nominal 0.078 in (1.98 mm) thick; continuous in profile indicated with 1/4 inch corner radius.
    - b. Retainer: Continuous extruded aluminum retainer; nominal 0.070 in (1.78 mm) thick.
    - c. Accessories: Prefabricated, injection-molded matching top cap with concealed splices, mounting hardware and other accessories as required.
    - d. Inset: Surface-mounted plastic wall protection (WP) as indicated below.
  - 2. Product Standards:
    - a. Drawing Designations CG-16: C/S Group; SM-20, Set of 2 with WP inset, full height as indicated by drawing designation.

## **2.7 STEEL ANGLE TYPE CORNER GUARDS**

- A. Drawing Designation CG-17 – Surface-Mounted Non-Fire Rated Steel Angle Corner Guard:
  - 1. Description: Steel angle 3 in x 3 in x 1/4 in (75 mm x 75 mm x 6mm).
  - 2. Mounting: 1/2 in x 4 in HS embed at 18 in on center.
  - 3. Finish after Fabrication: Hot-Dip Galvanize.

## **2.8 POLYCARBONATE TYPE CORNER GUARDS**

- A. Drawing Designation CG-18 and CG-19 - Surface-Mounted Plastic Corner Guards:
  - 1. Description: Fabricated from 0.085 in (2.2 mm) thick clear polycarbonate plastic sheet; 2 in by 2 in (50 by 50 mm) wings, with formed edges and 90 degree corner.
  - 2. Mounting Method: Chrome plated metal screws.

3. Product Standard:

- a. Drawing Designation CG-18 and CG-19: C/S Group; LG-200, full or partial height as indicated by drawing designation.

## **2.9 STAINLESS STEEL TYPE CORNER GUARDS**

A. Drawing Designation CG-20 and CG-21 - Surface-Mounted Stainless Steel Corner Guards:

- 1. Description: Fabricated from 16 gage, type 304 stainless steel; 3-1/2 in x 3-1/2 in (87 by 87 mm) wings; with formed edges and 90 degree corner; with No. 4 directional, satin finish, with strippable plastic temporary protection.
- 2. Mounting Method: Stainless steel flat-head screws.
- 3. Product Standard:
  - a. Drawing Designation CG-20 and CG-21: C/S Group; CO-8, full or partial height as indicated by drawing designation.

## **2.10 PLASTIC WALL PROTECTION**

A. Drawing Designation WP - Surface-Mounted Plastic Wall Protection:

- 1. Description: Fabricated from nominal 0.060 in (1.52 mm) thick extruded plastic sheets; with match wainscot and joint moldings and outside and inside corner trims as required.
- 2. Mounting Method: Adhesive.
- 3. Product Standard: C/S Group; Acrovyn.

B. Glass-Fiber Reinforced Plastic (FRP) Wall Protection: Refer to Division 06 Section "Plastic (FRP) Paneling".

## **2.11 FABRICATION**

- A. General Requirements: Fabricate wall protection system components to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including thicknesses of components.
- 1. Preassemble components in shop to greatest extent possible to minimize field assembly.
  - 2. Fabricate components with tight seams and joints with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer/fabricator's written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

### **3.4 EXAMINATION**

- A. Acceptance of Conditions: Examine substrate surfaces to which wall protection system components will be installed for compliance with requirements, installation tolerances and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance.

### **3.5 INSTALLATION**

- A. General: Install impact-resistant wall protection units level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
  - 1. Install impact-resistant wall protection units in locations and at mounting heights indicated on Drawings.
  - 2. Provide splices, mounting hardware, anchors, and other accessories required for a complete installation.
    - a. Provide anchoring devices to withstand imposed loads.
    - b. Where splices occur in horizontal runs of more than 20 ft (6.1 m), splice aluminum retainers and plastic covers at different locations along the run, but no closer than 12 in (300 mm).
    - c. Adjust end and top caps as required to ensure tight seams.
- B. Impact-Resistant Wall Covering: Install top and edge moldings, corners, and divider bars as required for a complete installation.

### **3.6 CLEANING**

- A. Immediately after completion of installation, clean plastic covers and accessories using a standard, ammonia-based, household cleaning agent.
- B. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

### **3.7 FINISH SCHEDULE**

- A. Color and Texture: As selected by Architect from full range of industry colors.

**END OF SECTION**

## **SECTION 10 2813**

### **TOILET ACCESSORIES**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Toilet accessories and supplementary items necessary for installation.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, dimensions, and profiles of individual components.
  - 2. Include details for cutouts required in other Work; include templates, substrate preparation instructions, and directions for preparing cutouts and installing anchoring devices.

##### **1.3 INFORMATIONAL SUBMITTALS**

- A. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
- B. Warranty: Sample of special warranty.
  - 1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

##### **1.4 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For inclusion in operation and maintenance manual as required by Division 01 Section "Operation and Maintenance Data". Include manufacturer's instructions for maintenance of installed Work, including methods and frequency for maintaining optimum condition under anticipated use. Include precautions against cleaning products and methods which may be detrimental to finishes and performance.

##### **1.5 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.
  - 1. Participants:
    - a. Architect.
    - b. Contractor, including superintendent.
    - c. Installer, including project manager and supervisor.
    - d. If requested, Manufacturer's qualified technical representative.
    - e. Installers of other construction interfaced with Work.

2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
  - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
  - b. Review Contract Document requirements.
  - c. Review approved submittals.
  - d. Review inspection and testing requirements.
  - e. Review environmental conditions and procedures for coping with unfavorable conditions.
  - f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
3. Record discussions, including decisions and agreements, and prepare report.

## **1.6 COORDINATION**

- A. Coordinate installation of products with interfacing and adjoining construction to provide a successful installation without failure.

## **1.7 WARRANTY**

- A. Mirror Manufacturer's Warranty: Furnish warranty for a period of 15 years from date of Substantial Completion agreeing to replace mirrors that develop visible silver spoilage defects, signed by an authorized representative using manufacturer's standard form.
- B. Hand Dryer Manufacturer's Warranty: Furnish warranty for a period of 10 years from date of Substantial Completion agreeing to repair or replace defective or faulty dryers, signed by an authorized representative using manufacturer's standard form.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to Conditions of the Contract and Division 01 Section "Substitution Procedures".
  1. A & J Washroom Accessories, Inc.
  2. American Specialties, Inc.
  3. Bobrick Washroom Equipment, Inc.
  4. Bradley Corp.
  5. Brey Krause Manufacturing.
  6. GAMCO, a Division of Bobrick.
- B. Shower Curtain Products Only:
  1. Barjan Manufacturing Ltd.
  2. Brite Inc.
  3. Gary Manufacturing.

- C. Basis of Design: Contract Documents are based on products specified to establish a standard of quality. Other manufacturers with products having equivalent characteristics may be considered, provided deviations are minor and do not change intended aesthetic, functional and performance requirements as judged by Architect.

## **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.
- B. General Requirements:
  - 1. Unless otherwise indicated, fabricate units of all-welded construction, with corners and returns as indicated, tight seams and joints, and exposed edges rolled.
  - 2. Fabricate frames drawn and leveled, one-piece seamless construction.
  - 3. Hang doors and access panels with full-length, stainless-steel hinges.
  - 4. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- C. Manufacturer Names or Labels: Not permitted on exposed faces of accessories. Provide printed label or stamped metal nameplate indicating manufacturer's name and product model number on an easily noticeable interior surface or on back surface of each accessory.
- D. Keys: Provide minimum of 6 universal keys for internal access to accessories for servicing and resupplying.
- E. Accessibility Requirements: Products and installation shall comply with Americans with Disabilities Act (ADA), ANSI A 117.1, and state and local accessibility standards.

## **2.3 MATERIALS**

- A. Stainless Steel: ASTM A 666, Type 304, with No. 4 satin finish; minimum 0.0312 in (0.8 mm) (22 gage) nominal thickness unless otherwise indicated.
- B. Mirror Glass: ASTM C 1036, Type I, Class 1, Quality q2, nominal 1/4 in (6 mm) thick, with silvering, electroplated copper coating, and protective organic coating.
- C. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- D. ABS Plastic: Moldable acrylonitrile-butadiene-styrene resin formulation.
- E. Galvanized Steel Mounting Devices: ASTM A 153, hot-dip galvanized after fabrication.
- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of non-corrosive metal when concealed.
- G. Sealant: Silicone mildew resistant sealant specified in Division 07 Section "Joint Sealants".

## **2.4 PAPER TOWEL DISPENSERS**

- A. Drawing Designation A1 - Surface-Mounted Paper Towel Dispenser:

1. Description: Fabricated of stainless steel; with hinged front equipped with full length stainless steel piano hinge and tumbler lock; pierced slots at sides as refill indicators; and sized to dispense not less than 400 C-fold or 525 multi-fold paper towels without special adapters.
  2. Basis of Design: Bobrick Washroom Equipment, Inc. Model B-262.
- B. Drawing Designation A2 – Surface Mounted Automatic Paper Towel (Roll) Dispenser:
1. Description: Surface mounted, automatic motion sensing mechanism with user-adjustable delay and paper towel length; battery powered. Sized to dispense 8-inch- (203-mm-) wide, 800-foot- (244-m-) long roll. Lockset: Tumbler type.
  2. Basis of Design: Bobrick Washroom Equipment, Inc. Model B-72974.
- C. Drawing Designation A3 - Recessed-Mounted Paper Towel Dispenser:
1. Description: Fabricated of stainless steel; with seamless exposed flange and hinged front equipped with full length stainless steel piano hinge, door-swing cable limiter, and tumbler lock; sized to dispense not less than 350 C-fold or 475 multi-fold paper towels without use of special adapters; for nominal 4 in (100 mm) wall depth.
  2. Basis of Design: Bobrick Washroom Equipment, Inc. Model B-359.

## 2.5 TOILET TISSUE DISPENSERS

- A. Drawing Designation B1 - Surface-Mounted Single-Roll Toilet Tissue Dispenser:
1. Description: Fabricated of heavy duty cast aluminum; sized to accommodate 5 in (125 mm) diameter core type tissue roll; molded ABS spindle, theft-resistant, with retractable pin and concealed locking mechanism.
  2. Basis of Design: Bobrick Washroom Equipment, Inc. Model B-2730.
- B. Drawing Designation B2 - Surface-Mounted Double-Roll Toilet Tissue Dispenser:
1. Description: Fabricated of heavy duty cast aluminum; sized to accommodate two separate 5 in (125 mm) diameter core type tissue rolls; molded ABS spindle, theft-resistant, with retractable pin and concealed locking mechanism.
  2. Basis of Design: Bobrick Washroom Equipment, Inc. Model B-2740.
- C. Drawing Designation B3 - Surface-Mounted Multi Roll Toilet Tissue Dispenser:
1. Description: Fabricated of stainless steel; with hinged front equipped with pivot hinge and tumbler lock; sized to store and dispense two 5 in (125 mm) diameter core type tissue rolls with reserve roll placed in service automatically when bottom roll is depleted; molded ABS spindle, theft-resistant, and held in dispenser when door is locked.
  2. Basis of Design: Bobrick Washroom Equipment, Inc. Model B-2888.
- D. Drawing Designation B4: SURFACE – PARTITION-MOUNTED
- 1) Manufacturer: Bobrick Washroom Equipment, Inc.
  - 2) Model Number: B-386
- D. Drawing Designation B5 - Recessed-Mounted Toilet Paper Holder (Psychiatric Use):

1. Description: Fabricated of stainless steel with seamless exposed flange; concealed mounting clamp studs for stud walls with spanner head exposed fasteners; chrome plated spindle with internal spring.
2. Basis of Design: Bobrick Washroom Equipment, Inc. Model B-6677.

E. Drawing Designation B6 - Recessed-Mounted Multi Roll Toilet Tissue Dispenser:

1. Description: Fabricated of stainless steel; with seamless exposed flange and hinged front equipped with pivot hinge and tumbler lock; sized to store and dispense two 5 in (125 mm) diameter core type tissue rolls with reserve roll placed in service automatically when bottom roll is depleted; molded ABS spindle, theft-resistant and held in dispenser when door is locked; for nominal 4 in (100 mm) wall depth.
2. Basis of Design: Bobrick Washroom Equipment, Inc. Model B-3888.

## 2.6 SANTARY NAPKIN DISPOSALS

A. Drawing Designation E1 - Surface-Mounted Sanitary Napkin Disposal Unit:

1. Description: Fabricated of stainless steel; with flush door equipped with continuous piano hinge and tumbler lock; self-closing disposal panel with spring-loaded full length stainless steel piano hinge and international symbol for sanitary napkin disposal; with removable 1.2 gal (4.6 L) capacity molded polyethylene receptacle.
2. Basis of Design: Bobrick Washroom Equipment, Inc. Model B-254.

B. Drawing Designation E2 - Recessed-Mounted Sanitary Napkin Disposal Unit:

1. Description: Fabricated of stainless steel; with seamless exposed flange; with flush door equipped with continuous piano hinge and tumbler lock; self-closing disposal panel with spring-loaded full length stainless steel piano hinge and international symbol for sanitary napkin disposal; with removable 1.2 gal (4.6 L) capacity molded polyethylene receptacle; for nominal 4 in (100 mm) wall depth.
2. Basis of Design: Bobrick Washroom Equipment, Inc. Model B-353.

C. Drawing Designation E3 - Partition-Mounted Dual-Access Sanitary Napkin Disposal Unit:

1. Description: Fabricated of stainless steel; with seamless adjustable exposed flange at both partition faces; self-closing disposal panel at both partition faces with spring-loaded full length stainless steel piano hinge and international symbol for sanitary napkin disposal; with removable 1.2 gal (4.6 L) capacity molded polyethylene receptacle.
2. Basis of Design: Bobrick Washroom Equipment, Inc. Model B-354.

## 2.7 GRAB BARS

A. Drawing Designation G1, G2, G3, G4, G5, G6 G8, G9, G10 - Straight Surface-Mounted Satin Finish Grab Bar with Slip-Resistant Gripping Surface:

1. Description: Fabricated of stainless steel tube; with minimum 0.050 in (1.25 mm) (18 gage) wall thickness and 1-1/2 in (38 mm) outside diameter, with 1-1/2 in (38 mm) clearance between wall surface and inside face of bar.
  - a. Gripping Surfaces: Satin texture with peened gripping surfaces.
  - b. Shapes: Either as indicated, or as required by condition requiring grab bar.
  - c. Mounting: Concealed flanged steel plate welded to end of bar, as required by mounting condition, with snap-on cover; engineered to support minimum 300 lbs (136 kg).

Basis of Design:

- a. TYPE 1: HORIZONTAL – 18 INCHES
  - 1) Manufacturer: Bobrick Washroom Equipment, Inc.
  - 2) Model Number: B-6806 x 18
- b. TYPE 2: HORIZONTAL – 24 INCHES
  - 1) Manufacturer: Bobrick Washroom Equipment, Inc.
  - 2) Model Number: B-6806 x 24
- c. TYPE 3: HORIZONTAL – 30 INCHES
  - 1) Manufacturer: Bobrick Washroom Equipment, Inc.
  - 2) Model Number: B-6806 x 30
- d. TYPE 4: HORIZONTAL – 36 INCHES
  - 1) Manufacturer: Bobrick Washroom Equipment, Inc.
  - 2) Model Number: B-6806 x 36
- e. TYPE 5: HORIZONTAL – 42 INCHES
  - 1) Manufacturer: Bobrick Washroom Equipment, Inc.
  - 2) Model Number: B-6806 x 42
- f. TYPE 6: VERTICAL – 18 INCHES
  - 1) Manufacturer: Bobrick Washroom Equipment, Inc.
  - 2) Model Number: B-6806 x 18
- g. TYPE 8: L-SHAPED, HORIZONTAL – 42"x54"
  - 1) Manufacturer: Bobrick Washroom Equipment, Inc.
  - 2) Model Number: B-6897
- h. TYPE 9: L-SHAPED, HORIZONTAL – 16"x30"
  - 1) Manufacturer: A & J Washroom Accessories
  - 2) Model Number: UG30X-G3016
- i. TYPE 10: U-SHAPED, HORIZONTAL – 24"x60"x24"
  - 1) Manufacturer: A & J Washroom Accessories
  - 2) Model Number: UG30X-V246024

## 2.8 SOAP DISPENSERS

A. Drawing Designation – ITEM J:

1. Basis of Design:

- a. TYPE 1: SURFACE - MANUAL
  - 1) Manufacturer: Bobrick Washroom Equipment, Inc.
  - 2) Model Number: B-4112

- b. TYPE 2: SURFACE - AUTOMATIC
  - 1) Manufacturer: Bobrick Washroom Equipment, Inc.
  - 2) Model Number: B-2012
- c. TYPE 3: RECESSED - MANUAL
  - 1) Manufacturer: Bobrick Washroom Equipment, Inc.
  - 2) Model Number: B-4063
- d. TYPE 5: COUNTER - MANUAL
  - 1) Manufacturer: Bobrick Washroom Equipment, Inc.
  - 2) Model Number: B-822
- e. TYPE 6: COUNTER - AUTOMATIC
  - 1) Manufacturer: Bobrick Washroom Equipment, Inc.
  - 2) Model Number: B-826

## 2.9 SOAP DISHS

### A. Drawing Designation – ITEM K

- 1. Basis of Design:
  - a. TYPE 1 SURFACE
    - 1) Manufacturer: Bobrick Washroom Equipment, Inc.
    - 2) Model Number: B-6807
  - b. TYPE 2: RECESSED
    - 1) Manufacturer: Bobrick Washroom Equipment, Inc.
    - 2) Model Number: B-4380
  - c. TYPE 3: RECESSED - CERAMIC
    - 1) Refer to Division 09, Section “TILING”.

## 2.10 FOLDING SHOWER SEATS

### A. Drawing Designation – ITEM L:

- 1. Basis of Design:
  - a. TYPE 1: WALL-MOUNTED – PADDED
    - 1) Manufacturer: Bobrick Washroom Equipment, Inc.
    - 2) Model Number: B-517 (right hand); B-518 (left hand)
  - b. TYPE 2: WALL-MOUNTED – COMPOSITE
    - 1) Manufacturer: Bobrick Washroom Equipment, Inc.
    - 2) Model Number: B-5181 (reversible)

## 2.11 CHANGING STATIONS

### A. Drawing Designation – ITEM M:

- 1. Basis of Design:
  - a. TYPE 1: SURFACE - HDPE
    - 1) Manufacturer: Koala Kare Products / Bobrick
    - 2) Model Number: KB200 (horizontal)
  - b. TYPE 2: SURFACE – STAINLESS STEEL
    - 1) Manufacturer: Koala Kare Products / Bobrick
    - 2) Model Number: KB110-SSWM (horizontal)
  - c. TYPE 3: RECESSED - HDPE
    - 1) Manufacturer: Koala Kare Products / Bobrick
    - 2) Model Number: KB100-ST (horizontal)
  - d. TYPE 4: RECESSED – STAINLESS STEEL
    - 1) Manufacturer: Koala Kare Products / Bobrick
    - 2) Model Number: KB110-SSRE (horizontal)

## **2.17 MIRRORS**

### **A. Drawing Designation – ITEM P:**

1. Basis of Design:
  - a. TYPE 1: STAINLESS STEEL FRAME
    - 1) Manufacturer: Bobrick Washroom Equipment, Inc.
    - 2) Model Number: B-295 x 18
  - b. TYPE 2: STAINLESS STEEL FRAME WITH SHELF
    - 1) Manufacturer: Bobrick Washroom Equipment, Inc.
    - 2) Model Number: B-676 x 24
  - c. TYPE 3: TILT STAINLESS STEEL FRAME
    - 1) Manufacturer: Bobrick Washroom Equipment, Inc.
    - 2) Model Number: B-287
  - d. TYPE 4: SELF-ILLUMINATED
    - 1) Manufacturer: Electric Mirror
    - 2) Model Number: Novo Lighted Mirror
    - 3) Sizes:
      - a) 24 inch x 36 inch

## **2.19 ROBE HOOKS**

### **B. Drawing Designation – ITEM R:**

1. Basis of Design:
  - a. TYPE 1: SINGLE
    - 1) Manufacturer: Bobrick Washroom Equipment, Inc.
    - 2) Model Number: B-6717
  - b. TYPE 2: DOUBLE
    - 1) Manufacturer: Bobrick Washroom Equipment, Inc.
    - 2) Model Number: B-76727

## **2.20 SANITIZER DISPENSERS**

### **A. Drawing Designation – ITEM T:**

1. Basis of Design:
  - a. TYPE 1: SURFACE - MANUAL
    - 1) Manufacturer: Purell Hand Sanitizer
    - 2) Model Number: S-14836
  - b. TYPE 2: SURFACE - AUTOMATIC
    - 1) Manufacturer: Purell Hand Sanitizer
    - 2) Model Number: H-1950

## **2.21 MOP AND BROOM HOLDERS**

### **A. Drawing Designation – ITEM U:**

1. Basis of Design:
  - a. TYPE 1: WITH SHELF
    - 1) Manufacturer: Bobrick Washroom Equipment, Inc.
    - 2) Model Number: B-224 x 36
  - b. TYPE 2: WITHOUT SHELF
    - 1) Manufacturer: Bobrick Washroom Equipment, Inc.
    - 2) Model Number: B-223 x 36

## **2.22 ROD, HOOKS, AND CURTAINS**

### **A. Drawing Designation – ITEM V:**

1. Basis of Design:
  - a. TYPE 1: CURVED ROD
    - 1) Manufacturer: Bobrick Washroom Equipment, Inc.
    - 2) Model Numbers:
      - a) Rod: B-4207 x 72 (72 inch); B-4207 x 60 (60 inch)
      - b) Hooks: B-204-1
      - c) Curtain: B-204-2 (42 inch); B-204-3 (70 inch)
  - b. TYPE 2: STRAIGHT ROD
    - 1) Manufacturer: Bobrick Washroom Equipment, Inc.
    - 2) Model Numbers:
      - a) Rod: B-207 x 72 (72 inch); B-207 x 60 (60 inch); B-207 x 48 (48 inch); B-207 x 36 (36 inch).
      - b) Hooks: B-204-1
      - c) Curtain: B-204-2 (42 inch); B-204-3 (70 inch)

## **2.25 GLOVE DISPENSERS**

### **A. Drawing Designation – ITEM X:**

1. Basis of Design:
  - a. TYPE1: STAINLESS STEEL - DOUBLE
    - 1) Manufacturer: Dynamic Diagnostics
    - 2) Model Numbers: 300015
  - b. TYPE 2: STAINLESS STEEL - TRIPLE
    - 1) Manufacturer: Dynamic Diagnostics
    - 2) Model Numbers: 300014
  - c. TYPE 3: STAINLESS STEEL - QUAD
    - 1) Manufacturer: Dynamic Diagnostics
    - 2) Model Numbers: 300013

## **3 EXECUTION**

### **3.19.1.1 EXAMINATION**

3.19.1.1.1 Acceptance of Surfaces and Conditions: Examine substrates to receive products and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.19.1.2 INSTALLATION, GENERAL**

3.19.1.2.1 Installation Quality Standards: In addition to standards listed elsewhere, install toilet accessories according to the following, unless otherwise specified in this Section:

- 3.19.1.2.1.1 Respective manufacturer's written installation instructions.
- 3.19.1.2.1.2 Accepted submittals.
- 3.19.1.2.1.3 Contract Documents.

### **3.19.1.3 PREPARATION**

3.19.1.3.1 General: Comply with manufacturer's instructions, recommendations and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

### **3.19.1.4 INSTALLATION**

3.19.1.4.1 General Requirements: Install toilet accessories level, plumb, and firmly anchored in locations and at heights indicated. Use fasteners that are appropriate to substrate indicated and as recommended by respective product manufacturer.

3.19.1.4.2 Grab Bars: Install to withstand downward load of minimum 250 lbf (1.10 kN) according to ASTM F 446.

3.19.1.4.3 Accessories within Shower and Tub Alcoves: Set flanges of accessories in sealant, install sealant in screw holes prior setting screws, and cover screw head prior to snapping on cover, to prevent water infiltration.

3.19.1.4.4 Mirrors: Secure to walls in concealed, tamper-resistant manner with special hangers, toggle bolts, or screws.

**END OF SECTION**

## **SECTION 104116**

### **EMERGENCY KEY CABINETS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Emergency key cabinets and supplementary items necessary for installation.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Samples for Verification Purposes: 3 in (75 mm) square sample of exposed metal to indicate compliance with finish specified.

##### **1.3 QUALITY ASSURANCE**

- A. Local Authority Approval: Obtain approval of local fire department for keyway access and exact location and type of emergency key cabinet mounting prior to Product Data submittal.
- B. Emergency key cabinet will be required at building entrance(s) designated by the fire department or at the building's fire control room; as appropriate.

##### **1.4 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

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

##### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.
  - 1. Knox Company.

##### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

## **2.3 EMERGENCY KEY CABINET**

- A. Product Standard: Knox Company; Knox-Box 3200 Series Hinged or Lift-Off Door Model, as required by local jurisdiction. 1/4 in (6 mm) thick steel plate housing, 1/2 in (12 mm) thick steel door with interior gasket seal and stainless steel door hinge. Box and lock shall be UL Listed.
  - 1. Lock shall have 1/8 in (3 mm) thick stainless steel dust cover with tamper seal mounting capability.
  - 2. Lock shall have double-action rotating tumblers and hardened steel pins accessed by a biased cut key.
  - 3. Coordinate other necessary requirements with local fire department.
  - 4. Provide UL Listed alarm tamper switches as required by local fire department.
- B. Size: One of the following, recessed or surface mount; as indicated on drawings:
  - 1. Recessed Mount: 7 in (175 mm) wide by 7 in (175 mm) high by 3 in (75 mm) deep.
    - a. Provide manufacturer's standard recessed mounting kit (RMK) including shell housing and mounting hardware for cast-in construction.
  - 2. Surface Mount: One of the following as required by local jurisdiction:
    - a. Hinged Door Model: 5 in (125 mm) wide by 4 in (100 mm) high by 3-3/4 in (94 mm) deep.
    - b. Surface Mount - Lift-Off Door Model: 4 in (100 mm) wide by 5 in (125 mm) high by 3-3/4 in (94 mm) deep.
- C. Finish: Manufacturer's standard weather resistant polyester powder coat.
  - 1. Color: As selected by Architect from manufacturer's standard colors.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer's written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

### **3.4 INSTALLATION OF EMERGENCY KEY CABINETS**

- A. Install in accordance with manufacturer's latest published requirements.
- B. Recess Mount Units: Securely attach recessed mounting kit within cast-in wall construction. Shell housing box shall be flush with face of finished wall and plumb and level to ensure vertical alignment of box.
- C. Tamper Switches: Install switches, including control wiring, as follows:
  - 1. Refer to Division 26 Sections for connection to electrical power distribution system.
  - 2. Coordinate tamper switches with building security system.

**END OF SECTION**

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2019-07-26

EMERGENCY KEY CABINETS

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## **SECTION 10 4400**

### **FIRE-PROTECTION SPECIALTIES**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Work required for this section includes fire protection specialties (fire extinguishers, cabinets, accessories) and supplementary items necessary to complete their installation.
- B. Cabinets for fire protection standpipe and hose systems are specified in Division 21.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
  - 2. Fire Extinguishers: Include rating and classification.
  - 3. Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.

##### **1.3 QUALITY ASSURANCE**

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Standard for Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

##### **1.4 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

##### **1.5 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

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

##### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".

1. J. L. Industries, Inc.; a division of Activar Construction Products Group.
2. Larsen's Manufacturing Company.
3. Potter Roemer LLC.

## **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

## **2.3 MATERIALS**

- A. Stainless-Steel Sheet: ASTM A 666/A 666M, Type 302 or Type 304 alloy.

## **2.4 PORTABLE FIRE EXTINGUISHERS**

- A. General: Provide fire extinguishers of type, size, and capacity for each cabinet and other locations indicated.
- B. Multipurpose Dry Chemical Type; typical unless otherwise indicated or specified: UL-rated 2A:10B:C, 5-lb nominal capacity, in enameled steel container.

## **2.5 FIRE-PROTECTION CABINETS**

- A. Cabinet Construction: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld joints and grind smooth. Miter and weld perimeter door frames.
- B. Cabinet:
  1. Material:
    - a. Stainless steel.
  2. Type: Suitable for 10 lb. Fire extinguisher.
  3. Mounting:
    - a. Semi-recessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
  4. Trim Style: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth. Same metal and finish as door.
    - a. Exposed Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
      - 1) Square-Edge Trim: 1-1/4 in (32 mm) to 1-1/2 in (38 mm) backbend depth.
  5. Door Material:
    - a. Stainless steel.
  6. Door Glazing: Manufacturer's standard tempered float glass (clear).
  7. Door Style: Manufacturer's standard vertical duo panel design.
  8. Door Construction: Fabricate doors according to manufacturer's standards, of materials indicated, and coordinated with cabinet types and trim styles selected. Provide minimum

1/2 in (12mm) thick door frames, fabricated with tubular stiles and rails, and hollow-metal design.

9. Door Hardware: Provide manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide either lever handle with cam-action latch, or exposed or concealed door pull and friction latch. Provide concealed or continuous-type hinge permitting door to open 180 degrees.

## **2.6 ACCESSORIES**

- A. Mounting Brackets: Manufacturer's standard steel, designed to secure extinguisher, of sizes required for types and capacities of extinguishers indicated, with plated or baked-enamel finish. Provide brackets for extinguishers not located in cabinets.
- B. Identification: Provide lettering to comply with authorities having jurisdiction for letter style, color, size, spacing, and location.
  1. Bracket-Mounted Extinguishers: Identify with the words "FIRE EXTINGUISHER" in red letter decals applied to wall surface.
  2. Fire Extinguisher Cabinet: Identify with the words "FIRE EXTINGUISHER" in black die cut vinyl letters applied to door.

## **2.7 GENERAL FINISH REQUIREMENTS, FIRE-PROTECTION CABINETS**

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces of fire protection cabinets from damage by applying a strippable, temporary protective covering before shipping.
- C. Finish fire protection cabinets after assembly.
- D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## **2.8 STEEL FINISHES, FIRE-PROTECTION CABINETS**

- A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning" or SSPC-SP 8, "Pickling". After cleaning, apply a conversion coating suited to the organic coating to be applied over it.
- B. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).
  1. Color and Gloss: As selected by Architect from manufacturer's full range.

## **2.9 STAINLESS-STEEL FINISHES, FIRE-PROTECTION CABINETS**

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. Run grain of directional finishes with long dimension of each piece.
2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
3. Directional Satin Finish: No. 4.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.
- B. Examine fire extinguishers for proper charging and tagging.
  1. Remove and replace damaged, defective, or undercharged fire extinguishers.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  1. Respective manufacturer written installation instructions.
  2. Accepted submittals.
  3. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

### **3.4 INSTALLATION**

- A. Comply with manufacturer's written instructions for installing fire-protection specialties.
- B. Install in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
  1. Prepare recesses for cabinets as required by type and size of cabinet and trim style.
  2. Fasten cabinets to structure, square and plumb.

### **3.5 ADJUSTING, CLEANING, AND PROTECTION**

- A. Adjust cabinet doors that do not swing or operate freely.

- B. Refinish or replace cabinets and doors damaged during installation.
- C. Provide final protection and maintain conditions that ensure that cabinets and doors are without damage or deterioration at the time of Substantial Completion.

**END OF SECTION**

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2019-07-26**

**FIRE-PROTECTION SPECIALTIES**

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## **SECTION 10 5113**

### **METAL LOCKERS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

A. Work required for this Section includes metal lockers and supplementary items necessary to complete their installation.

##### **1.2 ACTION SUBMITTALS**

A. Product Data: Manufacturer's technical literature for each product and system indicated.

1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance for each type of locker and bench.

B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work

1. Show locker fillers, trim, base, tops, and accessories. Include locker-numbering sequence.

C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for units with factory-applied color finishes.

D. Samples for Verification: For each locker color selected, in manufacturer's standard size samples, but not less than 4 inch square, showing the full range of color, texture, and pattern variations expected. Prepare Samples from the same material to be used for the Work.

##### **1.3 CLOSEOUT SUBMITTALS**

A. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals specified in Division 01.

##### **1.4 QUALITY ASSURANCE**

A. Regulatory Requirements: Unless otherwise indicated, at least 5 percent but no less than one of each type of lockers shall comply with accessibility requirements, of the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG).

1. Provide not less than one shelf located within required reach ranges.

2. Provide hardware that does not require tight grasping, pinching, or twisting of the wrist, and that operates with a force of not more than 5 lbf.

##### **1.5 PRE-INSTALLATION CONFERENCE**

A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

## **1.6 COORDINATION**

A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".

B. Bases of design:

- a. 6' high, 12"W X 24"H X 15" D triple tier, one wide, and three wide. With sloping top, end and front base, with resettable factory installed combination lock.
- b. 6' high, 12"W X 24"H X 15" D four tier one wide and three wide. With sloping top, end and front base.
- c. 6' High, 15" W X 24"H X 18" D triple tier, one wide and three wide. With sloping top, end and front base.

- 1. Art Metal Products; Standard K.D. Lockers.
- 2. ASI Storage Solutions Inc.; Traditional Collection.
- 3. DeBourgh Mfg. Co.; Worley Lockers.
- 4. List Industries Inc.; Classic Line of Superior KD Lockers.
- 5. Lyon Workspace Products, LLC; Standard Lockers.
- 6. Penco Products, Inc.; Vanguard Lockers.
- 7. Republic Storage Systems Company; Standard Lockers.
- 8. Salisbury industries

### **2.2 MATERIALS, GENERAL**

A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

### **2.3 MATERIALS**

A. Cold-Rolled Steel Sheet: ASTM A 366, matte finish, suitable for exposed applications, and stretcher leveled or roller leveled to stretcher-leveled flatness.

B. Fasteners: Zinc- or nickel-plated steel, slotless-type exposed bolt heads, and self-locking nuts or lock washers for nuts on moving parts.

### **2.4 WARDROBE LOCKERS**

A. Body: Form backs, tops, bottoms, sides, and intermediate partitions from 0.0239 inch (24 gage) minimum steel sheet; flanged for double thickness at back vertical corners.

- B. Frames: Form channel frames from minimum 0.0598-inch- thick steel sheet; lapped and welded at corners. Form continuous integral door strike on vertical frame members. Provide resilient bumpers to cushion door closing.
  - 1. Latch Hooks: Form from minimum 0.1046-inch- thick steel; welded or riveted to door frames.
  - 2. Cross Frames for Multi-Tier Lockers: Form intermediate channel cross frames between tiers from minimum 0.0598-inch- (1.50-mm-) thick steel sheet. Weld to vertical frame members.
- C. Doors: One-piece 0.0598 inch (16 gage) minimum steel sheet, formed into channel shape at vertical edges and flanged at right angles at top and bottom edges. Fabricate to prevent springing when opening or closing, and to swing 180 degrees.
  - 1. Reinforcement: Brace or reinforce inner face of doors more than 15 inches wide.
  - 2. Acoustical Treatment: Fabricate lockers for quiet operation with manufacturer's standard rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact.
  - 3. Louvered Vents: Stamped, louvered vents in door face, as follows:
    - a. Single-Tier Lockers: No fewer than six louver openings at top and bottom.
    - b. Double-Tier Lockers: No fewer than three louver openings at top and bottom.
    - c. Multiple-Tier Lockers: No fewer than two louver openings at top and bottom, or three louver openings at top or bottom.
- D. Shelves: Provide hat shelf in single-tier units; fabricated from minimum 0.0239-inch- thick, formed steel sheet; flanged on all edges.
- E. Hinges: Steel, full loop, five or seven knuckle; tight pin; minimum 2 inches high. Weld to inside of door frame and attach to door with at least two factory-installed fasteners that are completely concealed and tamper resistant when door is closed.
  - 1. Provide at least three hinges for each door more than 42 inches high and at least two hinges for each door 42 inches high or less.
- F. Recessed Handle and Latch: Manufacturer's standard housing, formed from 0.0359-inch- thick nickel-plated steel or stainless steel, with integral door pull, recessed for latch lifter and locking devices; nonprotruding latch lifter; and automatic, prelocking, pry-resistant latch, as follows:
  - 1. Provide minimum three-point latching for each door more than 42 inches high; minimum two-point latching for each door 42 inches high or less.
    - a. Provide strike and eye for padlock.

## 2.5 BUILT-IN LOCKS

- A. Fabricate lockers to receive the following locking devices, installed on lockers using security-type fasteners:
  - 1. Combination Locks: Built-in key-controlled, three-number dialing combination locks; capable of at least five combination changes made automatically with a control key. Comply with the following:

- a. Bolt Operation: Manually locking dead bolt or automatically locking spring bolt, as standard with manufacturer.

## **2.6 LOCKER ACCESSORIES**

- A. Interior Equipment: Furnish each locker with the following items, unless otherwise indicated:

1. Hooks: Manufacturer's standard zinc-plated, ball-pointed steel. Provide one double-prong ceiling hook, and not fewer than two single-prong wall hooks for single-, double-, and triple-tier units. Attach hooks with at least two fasteners.

2. Coat Rods: Manufacturer's standard galvanized steel. Provide rod in lieu of ceiling hook for lockers 18 inches deep or greater.

B. Number Plates: Manufacturer's standard etched, embossed, or stamped, aluminum number plates with numerals at least 3/8 inch high. Number lockers in sequence indicated. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.

C. Continuous Metal Base: Minimum 0.0598-inch- (16 gage) thick steel sheet, 6 inch high channel or zee profiled for stiffness, fabricated in lengths as long as practicable to enclose base and base ends of lockers, and finished to match lockers.

D. Continuously Sloping Tops for Non-Recessed Units: Manufacturer's standard, fabricated from minimum 0.0359-inch- (20 gage) thick steel sheet, for installation over lockers with separate flat tops. Fabricate tops in lengths as long as practicable, without visible fasteners at splice locations, finished to match lockers. Provide fasteners, filler plates, supports, and vertical end closures.

E. Recess Trim for Recessed Units: Manufacturer's standard; fabricated from minimum 0.0478-inch- (18 gage) thick steel sheet, minimum 2-1/2-inch face width, and finished to match lockers. Fabricate trim in lengths as long as practicable.

F. Filler Panels: Manufacturer's standard; fabricated from minimum 0.0478-inch- (18 gage) thick steel sheet in an unequal leg angle shape, and finished to match lockers. Provide slip joint filler angle formed to receive filler panel.

G. Finished End Panels for Non-Recessed Units: Manufacturer's standard; fabricated from minimum 0.0239-inch- (24 gage) thick steel sheet, finished to match lockers, and designed for concealing exposed ends of non recessed lockers.

## **2.7 LOCKER BENCHES**

A. Bench Tops: Manufacturer's standard one-piece units, with rounded corners and edges, of the following material; minimum 9-1/2 inches wide by 1-1/4 inches thick (241 mm wide by 32 mm thick) except provide minimum 20-inch- (508-mm-) wide tops where accessible benches are indicated.

1. Laminated Maple: Laminated maple with one coat of clear sealer on all surfaces, and one coat of clear lacquer on top and sides.

B. Pedestals: Provide manufacturer's standard pedestal supports, with predrilled fastener holes, complete with fasteners and anchors, and as follows:

1. Fixed Type: Tubular steel, minimum 1-1/4-inch diameter, with minimum 0.1345-inch-thick steel flanges welded at top and base, and baked-enamel finish; floor anchored with exposed fasteners.
2. Color: Match locker units.

C. Furnish a minimum of two pedestals for each bench, with pedestal spacing not more than 72 inches o.c.

## **2.8 FABRICATION**

A. Unit Principle: Fabricate each locker with an individual door and frame, individual top, bottom, back, and shelves, and common intermediate uprights separating compartments.

B. Knocked-Down Construction: Fabricate lockers for nominal assembly at Project site.

C. Fabricate lockers square, rigid, and without warp, with metal faces flat and free of dents or distortion. Make exposed metal edges free of sharp edges and burrs, and safe to touch. Weld frame members together to form a rigid, one-piece assembly.

1. Form locker-body panels, doors, shelves and accessories from one-piece steel sheet, unless otherwise indicated.

## **2.9 FINISHES, GENERAL**

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

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## **2.10 STEEL SHEET FINISHES**

A. Surface Preparation: Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond. Use manufacturer's standard methods.

B. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard baked-enamel finish consisting of a thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 1.4 mils on doors, frames, and legs, and 1.1 mils elsewhere.

1. Color and Gloss: Gray.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:

1. Respective manufacturer written installation instructions.
2. Accepted submittals.
3. Contract Documents.

### **3.3 PREPARATION**

A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

### **3.4 INSTALLATION**

A. Install metal lockers and accessories level, plumb, rigid, and flush according to manufacturer's written instructions.

- B. Assemble knocked-down lockers with standard fasteners, with no exposed fasteners on door faces and face frames.
- C. Anchor lockers to floors and walls at intervals recommended by manufacturer, but not more than 36 inches o.c. Install anchors through backup reinforcing plates where necessary to avoid metal distortion, using concealed fasteners.
- D. Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.

1. Recessed Units:

- a. Attach recess trim to recessed lockers with concealed clips.

2. Non-Recessed Units:

- a. Attach sloping top units to lockers, with closures at exposed ends.
- b. Attach finished end panels with fasteners only at perimeter to conceal exposed ends of non-recessed lockers.

E. Fixed Locker Benches: Anchor locker benches to floor. Uniformly space pedestals not more than 72 inches apart and securely fasten to bench top and anchor to floor.

### **3.5 ADJUSTING, CLEANING, AND PROTECTION**

- A. Adjust doors and latches to operate easily without binding. Verify that integral locking devices operate properly.
- B. Clean interior and exposed exterior surfaces and polish stainless-steel and nonferrous-metal surfaces.
- C. Protect lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit locker use during construction.
- D. Touch up marred finishes, or replace locker units that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

### **3.6 LOCKER SCHEDULE**

- A. Refer to Interior Finish Schedule on drawings.

### **3.7 FINISH SCHEDULE**

- A. Locker Color and Gloss: Gray.

**END OF SECTION**

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METAL LOCKERS

## **SECTION 10 5713**

### **WALL MOUNTED COAT RACK AND SHELF**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Wall mounted coat rack and shelf along with supplementary items necessary for installation.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.

##### **1.3 INFORMATIONAL SUBMITTALS**

- A. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.

##### **1.4 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.

##### **1.5 PROJECT CONDITIONS**

- A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

##### **1.6 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
- B. Available Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those listed.
- C. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.
  - 1. EMCO Specialty Products, Inc.; Model R1, satin finish; identified on the drawings as Miscellaneous Specialty and Equipment item CR.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer/fabricator's written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
  - 1. Install wall blocking as required.

### 3.4 INSTALLATION

- A. Install coat rack and shelf level and plumb, according to manufacturers instructions.
  1. Where dissimilar metals contact each other, protect against galvanic action by painting contact surfaces with bituminous coating or by applying other permanent separation as recommended by manufacturer.
- B. Install wall strip using fasteners required for wall type. Height to be based on specified height of shelf.
- C. Install brackets, slat and rod using fasteners approved by manufacturer.

**END OF SECTION**

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WALL MOUNTED COAT RACK AND SHELF

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## **SECTION 10 7310**

### **ALUMINUM WALKWAYS AND CANOPIES**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Aluminum walkway covers and canopies and supplementary items necessary for installation.

##### **1.2 DESCRIPTION OF WORK**

- A. Definition: Aluminum walkways and canopies shall consist entirely of extruded aluminum sections (roll-formed not acceptable). System shall consist of heli-arc welded, one-piece rigid structural bents (column and beam assemblies), decking, fascia, accessory items and hardware to provide a complete system.
- B. Water shall drain from deck into designated beams and out at grade level of columns through weepholes.

##### **1.3 DELEGATED ENGINEERING REQUIREMENTS**

- A. Contract Documents Design Intent: Drawings and Specifications indicate design intent for products and systems and do not necessarily indicate or specify total Work required and shall not be construed as an engineered design. Furnish and install all Work required for a complete installation.
- B. Delegated Engineering Responsibility: Contractor shall employ a qualified professional engineer to provide engineering for products and systems including attachment to building structure required to meet design intent of Contract Documents including, but not limited to, the following.
  - 1. Preparation of structural analysis data including engineering calculations, shop drawings and other submittals signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Delegated Engineering Professional Qualifications: Professional engineer legally authorized to practice in Florida and experienced in providing engineering services of kind indicated for products and systems similar to this Project and has a record of successful in-service performance.
- D. Coordination of Contract Documents and Work:
  - 1. Product Variations: In the event of minor differences between products and systems of acceptable or available manufacturers, Contractor shall notify Architect of such differences and resolve conflicts in a timely manner. Failure of Contractor to provide notification shall be construed as acceptance of conditions indicated, and changes caused by minor differences between products and Contract Documents shall be included in the Work at no additional cost to Owner.

2. Allowable Adjustments: Minor dimension and profile adjustments may be made in interest of fabrication or erection methods or techniques or ability to satisfy design intent, provided design intent is maintained as determined by Architect. Proposed deviations shall include a detailed analysis of impact to adjacent substrates or other building systems, including related design or construction cost impacts. If accepted by Architect, deviations causing changes in materials, constructability, substrates, or conditions shall be included in the Work at no additional cost to Owner.

#### **1.4 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.
  1. Submit detailed drawings, layout of canopies system, bent locations (identify drain columns and wet bents), all mechanical joint locations with complete details, connections, jointing and accessories. Include details of concrete footings and bent anchorage.
  2. Submit complete details with structural properties (moment of inertia, section modules, modules of elasticity, etc.) for all proposed sections (beams, columns, decking and other structural members).

#### **1.5 INFORMATIONAL SUBMITTALS**

- A. Delegated Engineering Calculations: Informational submittal for products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation; test reports are not acceptable substitute for calculations.
- B. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.
- C. Qualification Data: For manufacturer, installer, and professional engineer.
  1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information specified.

#### **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 10 years experience with successful production of products and systems similar to scope of this Project, with a record of successful in-service performance and completion of projects for a period of not less than 10 years, and with sufficient production capability, facilities, and personnel to produce required Work.
- B. Installer Qualifications:

1. Experience: Installer with not less than 5 years experience in performing specified Work similar to scope of this Project, with a record of successful in-service performance and completion of projects for a period of not less than 5 years, and with sufficient production capability, facilities, and personnel to produce required Work.
  2. Supervision: Installer shall maintain a competent supervisor who is at Project during times specified Work is in progress, and, who is experienced in installing systems similar to type and scope required for Project.
  3. Manufacturer/Fabricator Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.
- C. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with minimum of 5 years experience in providing recommendations, observations, evaluations, and problem diagnostics. Sales representatives are not acceptable.
- D. Codes and Standards: Comply with provisions of the following except as otherwise indicated:
1. International Building Code, latest addition with amendments, if any.
  2. AWS (American Welding Society) standards for structural aluminum welding.

## **1.7 DELIVERY, STORAGE AND HANDLING:**

- A. Deliver, store and handle covered walkway system components as recommended by manufacturer. Handle and store in a manner to avoid deforming members and to avoid excessive stresses.

## **1.8 PROJECT CONDITIONS**

- A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

## **1.9 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

# **PART 2 - PRODUCTS**

## **2.1 MANUFACTURERS**

- A. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other available manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.
1. DITT-Deck Extruded Aluminum Walkway Cover System.

- B. Available Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those listed.

1. AVAdek Walkway Cover Systems and Canopies.
2. DITT-Deck Extruded Aluminum Canopies System by Dittmer Architectural Aluminum.
3. Mapes Industries.
4. Peachtree Protective Covers, Inc.
5. Superior Metal Products, LLC

## **2.2 PERFORMANCE REQUIREMENTS**

- A. General Performance: Engineer products and systems to withstand loads within limits of allowable working stresses of the materials involved under conditions indicated and without permanent deformation or failure of materials.
- B. System Performance: Provide aluminum covered walkway system that has been designed, produced, fabricated and installed to withstand normal temperature changes as well as live loading, dead loading and wind loading in compliance with International Building Code requirements for geographic area in which work is located and as follows:
1. Live Load: 20 psf minimum
  2. Structural design for wind forces: Comply with ANSI A58.1-1982
  3. Design Wind Velocity: 110 mph.
  4. Stability Criteria: Florida Building Code
- C. Sizes shown on drawings are to be considered minimum.
- D. Structure shall be capable of sustaining severe icing, hail, hurricane force winds and supporting a concentrated load such as being walked upon.

## **2.3 MATERIALS**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.
- B. All aluminum extrusions shall be alloy 6063 heat treated to a T-6 temper.
- C. Standard finish for all components shall be satin anodized 204-R1 meeting Aluminum Association Specification AA-M-10C-22A-21.
- D. Fasteners:
1. Deck Screws (rivets not permitted): Type 18-8 non-magnetic stainless steel sealed with a neoprene "O" ring beneath 5/8" outside dimension, conical washer.
  2. Fascia Rivets: Size 3/16" by 1/2" 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 FABRICATION**

- A. Comply with indicated profiles, dimensioned requirements, and structural requirements.

- B. Use sections true to details with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture, free from defects impairing strength and durability.
- C. All welding do be done by heli-arc process.
- D. Mechanical joints shall consist of stainless steel bolts with a minimum of two (2) bolts per fastening. Bolts and nuts shall be installed in a concealed manner utilizing 1/2" thick by 1 1/2" aluminum bolt bars welded to structural members. All such mechanical joints must be detailed on shop drawings showing all locations.
- E. Roof Deck: Extruded Aluminum shapes, interlocking self-flashing sections. Shop fabricate to lengths and panels widths required for field assembly. Depth of sections to comply with structural requirements. Provide shop induced camber in deck units with spans greater than 16'- 0" to offset dead load deflections. Welded dams are to be used at non-draining ends of deck.
- F. Expansion joints, design structure for thermal expansion and contraction. Provide expansion joints as required.
- G. Exposed rivets used to fasten bottom of fascia to deck to have finish to match fascia.
- H. Apply a shop applied dip-coat of clear acrylic enamel to each column end terminating in concrete to insulate from electrolytic reaction. Column ends shall be pierced to "key" grout to bent for maximum uplift protection.
- I. Shop Assembly: Preassemble units in shop to greatest extent possible and disassemble as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- J. Concealed Drainage: Water shall drain from the roof deck to the beams to the columns and drain above ground or below ground and tie into storm sewer. Reference drawings for locations and type.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer's written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.

- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials. Protect aluminum embedded or otherwise in contact with concrete and masonry with alkali resistant clear acrylic.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

### **3.4 CONCRETE FOOTINGS**

- A. Concrete footings are not work of this section. Refer to Division 03 Section "Cast-in-Place Concrete".
- B. Sleeves (styrofoam blockouts) shall be furnished by canopies manufacturer and placed by general contractor.

### **3.5 INSTALLATION**

- A. Erection: Set roof support frames into pockets provided in top of footings or anchor with anchor bolts and base plates as required; set to required elevations, align, plumb and level; and grout in place with 2,000 psi Portland cement grout. Assure that grout fills all voids and "keys" to columns. Fill downspout units with grout to bottom of discharge level. Install aluminum deflectors after grouting. Follow manufacturer's instructions. Match to finish and elevation of adjacent sidewalks.
- B. Install roof deck sections, accessories and related flashing in accordance with manufacturer's instructions. Provide roof slope for rain drainage without ponding water. Align and anchor roof deck units to structural support frames.
- C. Take extreme care to prevent damage or scratching. Replace damaged components prior to installation. All workmanship must be top quality with neat miters and fitted joints.

### **3.6 FLASHING**

- A. Flashings: Flashings required between covered walkway system and adjoining structures are not work of this section. Refer to Division 07 Section "Sheet metal Flashing and Trim".

### **3.7 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall inspect first day's Work and periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.

### **3.8 CLEANING AND PROTECTION**

- A. Damaged Units: Replace roof deck panels and other components of the work which have been damaged or have deteriorated beyond successful minor repair.

- B. Cleaning: Remove protective coverings at time in project construction sequence which will afford greatest protection of work. Clean finished surfaces as recommended by manufacturer. Maintain in a clean condition during construction.
- C. Protection: Advise Contractor of protection and surveillance procedures, as required to ensure that work of this section will be without damage or deterioration at time of substantial completion.

END OF SECTION



## **SECTION 10 7500**

### **FLAGPOLES**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section includes flagpoles and supplementary items necessary to complete work required for their installation.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.
  - 1. Indicate general layout, jointing, grounding method, and anchoring and supporting systems. Include details of foundation system for ground-set poles.
- C. Samples of each finished metal for flagpoles and accessories as requested by Architect.

##### **1.3 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Design Criteria: Provide flagpoles and installations constructed to withstand wind velocity minimum when flying flag of appropriate size. Use heavy pipe sizes if required for flagpole type and height shown.
  - 1. Design flagpoles in accordance with ANSI/NAAMM FP 1001.
  - 2. Flag size shall be as recommended by NAAMM "Flagpole Manual".
- C. Pole Construction: Construct pole and ship to site in one piece if possible. If more than one piece is necessary, provide snug-fitting, precision joints with self-aligning, internal splicing sleeve arrangement for weather-tight, hairline field joints.

##### **1.4 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

## **1.5 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure

## **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. General: Spiral wrap flagpoles with heavy Kraft paper or other weather-tight wrapping and prepare for shipment in hard fiber tube or other protective container.
- B. Deliver flagpoles and accessories completely identified for installation procedure. Handle and store flagpoles to prevent damage or soiling.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS AND PRODUCTS**

- A. **Acceptable** Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those listed.
  - 1. Aabec Pole Div., Morgan-Francis Co.
  - 2. Adams Flagpole Div. of Morgan Products Inc.
  - 3. American Flagpole Div. of Kearney-National, Inc.
  - 4. Concord Industries, Inc.
  - 5. EMC Div., Eder Manufacturing Corp.
  - 6. Eder Flag Manufacturing Co., Inc.
  - 7. John Ewing and Co., Inc.
  - 8. Pole-Tech, Inc.

### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

### **2.3 FLAGPOLE TYPE**

- A. Aluminum Flagpoles: Fabricate from seamless extruded tubing complying with ASTM B 241, alloy 6063-T6, having a minimum wall thickness of 3/16 inch (0.1875 inch), tensile strength not less than 30,000 psi, and a yield point of 25,000 psi. Heat-treat and age-harden after fabrication.
  - 1. Provide cone-tapered aluminum flagpoles.

### **2.4 FLAGPOLE MOUNTING**

- A. Provide manufacturer's standard base system for the type of flagpole installation required.
  - 1. Provide manufacturer's standard flash collar, finished to match flagpole.

## **2.5 SHAFT FINISH**

- A. Aluminum: Finish designations prefixed by "AA" conform to the Aluminum Association system for designating aluminum finishes. Provide fine, directional, medium satin polish (AA-M32), finished as follows:
  - 1. Color anodized finish, complying with AA-C22A42, Class I (0.7 mil). Color as selected.

## **2.6 FITTINGS**

- A. Finial Ball: Manufacturer's standard flush-seam ball, size as indicated or, if not indicated, to match pole butt diameter.
  - 1. 14-gage spun aluminum finished to match pole shaft.
- B. Exterior Halyard System:
  - 1. Truck: Ball-bearing, nonfouling, revolving, double-track assembly of cast metal finished to match pole shaft.
  - 2. Cleats: Two 9-inch cast metal cleats with fasteners, finished to match pole shaft.
  - 3. Halyards: Provide two Polypropylene, braided, white continuous halyards for each flagpole.
- C. Halyard Flag Snaps: Provide two bronze swivel snaps per halyard.
- D. Internal Halyard System: Furnish pole with internal halyard system consisting of a manually operated, geared winch with control stop device and removable handle. Provide stainless steel braided aircraft-type cable and concealed revolving truck assembly with plastic-coated counter balance and sling. Provide reinforced, flush access door, secured with cylinder lock.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials

### **3.3 PREPARATION FOR GROUND-SET POLES**

- A. Concrete: Provide concrete composed of portland cement, coarse and fine aggregate, and water mixed in proportions to attain 28-day compressive strength of not less than 3000 psi, complying with ASTM C 94.
- B. Place concrete immediately after mixing. Compact concrete in place by use of vibrators. Moist-cure exposed concrete for not less than 7 days, or use a nonstaining curing compound in cold weather.
- C. Finish trowel exposed concrete surfaces to smooth, dense surface. Provide positive slope for water runoff to base perimeter.

### **3.4 FLAGPOLE INSTALLATION**

- A. General: Prepare and install flagpoles where shown and in compliance with accepted shop drawings and manufacturer's instructions.
  - 1. Provide positive lightning ground for each flagpole installation.
  - 2. Paint below-grade portions of ground-set flagpole with heavy coat of bituminous paint.

**END OF SECTION**

## **SECTION 11 2400**

### **BUILDING MAINTENANCE EQUIPMENT**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: Building maintenance equipment system and supplementary items necessary for installation.

##### **1.2 DELEGATED ENGINEERING REQUIREMENTS**

- A. Contract Documents Design Intent: Drawings and Specifications indicate design intent for products and systems and do not necessarily indicate or specify total Work required. Contract Documents shall not be construed as an engineered design; furnish and install all Work required for a complete installation.
- B. Delegated Engineering Responsibility: Contractor shall employ a qualified professional engineer to provide engineering for products and systems including attachment to building structure required to meet design intent of Contract Documents.
  - 1. Preparation of structural analysis data including engineering calculations, shop drawings and other submittals signed and sealed by the qualified professional engineer.
- C. Delegated Engineering Professional Qualifications: Professional engineer legally authorized to practice in jurisdiction where Project is located and experienced in providing engineering services of kind indicated for products and systems similar to this Project and has a record of successful in-service performance.
- D. Coordination of Work:
  - 1. Product Variations: In the event of minor differences between products and systems of acceptable or available manufacturers, Contractor shall notify Architect of such differences and resolve conflicts in a timely manner. Failure of Contractor to provide notification shall be construed as acceptance of conditions indicated, and changes caused by minor differences between products and Contract Documents shall be included in the Work at no additional cost to Owner.
  - 2. Allowable Adjustments: Minor dimension and profile adjustments may be made in interest of fabrication or erection methods or techniques or ability to satisfy design intent, provided design intent is maintained as determined by Architect. Proposed deviations shall include a detailed analysis of impact to adjacent substrates or other building systems, including related design or construction cost impacts. If accepted by Architect, deviations causing changes in materials, constructability, substrates, or conditions shall be included in the Work at no additional cost to Owner.

##### **1.3 ACTION SUBMITTALS**

- A. Product Data: Manufacturer/fabricator's technical literature for each product and system indicated.

1. Include manufacturer/fabricator's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.
  1. Locate anchorages to suit maintenance equipment to be used on the Project. Considerations shall be made addressing such items as reach, rigging, spacing, roof edge condition, and other similar items.
  2. Design anchor components to provide adequate attachment to the building structure that is suited to suspended maintenance industry practices and to ensure compatibility with equipment to be provided in this Project.

#### **1.4 INFORMATIONAL SUBMITTALS**

- A. Delegated Engineering Calculations: Informational submittal for products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation; test reports are not acceptable substitute for calculations.
- B. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
- C. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".
- D. Manufacturer/fabricator's Project Acceptance Document: Certification by the manufacturer/fabricator that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.
- E. Qualification Data:
  1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
  2. Evidence of required insurance coverage.
  3. Written explanation of nature of any litigation resulting in failure of equipment.
- F. Welding Certification: Welding certificates required by "Quality Assurance" Article. Include names of firms and personnel certified.

#### **1.5 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: To include in maintenance manuals.
  1. Posted Record Drawings: Provide plastic laminate encased record roof plan at each point of access to roof indicating equipment locations and details.
  2. Inspection Forms: Copy of Equipment Manual & Inspection Log Book including completed "Initial Inspection - Certification for Use" and "Inspection Sign-Off" forms.

## **1.6 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 10 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
  - 1. Insurance Coverage: Manufacturer/fabricator shall carry specific liability insurance (products and completed operations) in the amount of \$10,000,000.00 to protect against product / system failure of building maintenance equipment.
  - 2. Litigation Disclosure: If any, submit written explanation of nature of litigation resulting in failure of equipment.
- B. Installer Qualifications:
  - 1. Experience: Installer's personnel with not less than 10 years of experience in the successful performance of Work similar to scope of this Project.
  - 2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 10 years of experience installing products and systems similar to scope of this Project.
  - 3. Manufacturer/Fabricator Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer/fabricator to install products.
- C. Welding Qualifications: Qualify procedures and personnel according to AWS qualification requirements and following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel".
  - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum".

## **1.7 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.
  - 1. Participants:
    - a. Architect.
    - b. Contractor, including superintendent.
    - c. Installer, including project manager and supervisor.
    - d. If requested, Manufacturer's qualified technical representative.
    - e. Installers of other construction interfaced with Work.
  - 2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
    - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
    - b. Review Contract Document requirements.
    - c. Review approved submittals.
    - d. Review inspection and testing requirements.
    - e. Review environmental conditions and procedures for coping with unfavorable conditions.
    - f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.

3. Record discussions, including decisions and agreements, and prepare report.

## **1.8 PROJECT CONDITIONS**

- A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

## **1.9 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURER AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
- B. Available Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those listed.
  1. HighRise Systems, Inc.
  2. Guardian Fall Protection.
  3. Pro-Bel Enterprises, Ltd.
  4. Rooftop Anchors, Inc.
  5. Spider, a Division of SafeWorks, LLC.
  6. Sky Rider Equipment Co., Inc.
  7. Tractel Group, Swingstage Division.

### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer/fabricator. Provide secondary materials only as recommended by manufacturer/fabricator of primary materials.

### **2.3 PERFORMANCE REQUIREMENTS**

- A. General Performance: Engineer products and systems to withstand loads within limits of allowable working stresses of the materials involved under conditions indicated and without permanent deformation or failure of materials.
- B. Design Loads: Engineer to withstand design loads including but not limited to gravity, wind, seismic, and erection design loads and thermal movements established by authorities having jurisdiction, applicable local building codes, and as indicated. Contractor shall obtain required design data and identify movements accommodated on submittal drawings.

- C. Delegated Engineering Quality Standards: Determine allowable working stresses of materials according to authorities having jurisdiction, applicable local building codes, or information indicated, or, if standard not indicated, use latest editions of following:
  - 1. Structural Steel: AISC S342L with Supplement No. 1, "Load and Resistance Factor Design Specification for Structural Steel Buildings".
  - 2. Aluminum: AA ADM-1.
  - 3. Window Cleaning Safety: ANSI/IWCA I-14.1 and OSHA 1910, Subpart D.
  - 4. Personal Fall Arrest: Appendix C to OSHA 1910 Subpart F.
  - 5. Powered Platforms:
    - a. OSHA 1910.66, Subpart F.
    - b. ASME A120.1.
  - 6. Electrical: NEC with UL listed devices.
- D. Thermal Movements: Engineer products and systems to accommodate thermal movements of supporting elements resulting from the following maximum change (range) in ambient and surface temperatures without buckling, damaging stresses, damaging loads on fasteners, failure of operating units to function properly, and other detrimental effects.
  - 1. Temperature Change (Range): 120 deg F (49 deg C), ambient; 180 deg F (82 deg C), material surfaces.
- E. Dimensional Tolerances: Engineer products and systems to accommodate dimensional tolerances of framing members and adjacent construction.
  - 1. Equipment Layout and Coordination: Locate anchorages to suit suspension equipment that will be used on building with respect to items such as reach, rigging, spacing, roof edge condition, and similar items. Coordinate components with architectural and structural concept expressed in Contract Documents. Changes to Contract Documents, including reinforcing and concrete materials and installation, necessitated by equipment shall be considered as a substitution.
  - 2. Interface with Roof Coverings: Exposed portion of roof mounted components shall not be less than height indicated so that it is suitable for enclosure by sheet metal flashing.

## 2.4 MATERIALS

- A. Metal Material Qualities: Metal used for components with not less than strength and durability properties required to fulfill performance requirements for components.
- B. Steel Plates, Shapes, and Bars: ASTM A 36 / A 36M.
- C. Steel Pipe: ASTM A 53 / A 53M.
- D. Aluminum:
  - 1. Extruded Bars, Tubes and Shapes: ASTM B 221 / B 221M.
  - 2. Plate and Sheet: ASTM B 209 / B 209M.
  - 3. Drawn Seamless Tubes: ASTM B 483 / B 483M.
  - 4. Castings: ASTM B 26 / B 26M.
- E. Stainless Steel:

1. Tubing: ASTM A 554, Grade MT 304.
2. Pipe: ASTM A 312 / A 312M, Grade TP 316.
3. Sheet, Strip, Plate, and Flat Bar: ASTM A 666, Type 316.
4. Bars and Shapes: ASTM A 276, Type 316.
5. Castings: ASTM A 743 / A 743M, Grade CF 8 or CF 20.
6. Wire Rope: ASTM A 492, Type 316 wire, stranded according to engineered design.

- F. Welding Rods and Bare Electrodes: Selected according to AWS specifications for metal alloy to be welded.

## **2.5 FASTENERS**

- A. Fastener Materials: Stainless steel fasteners of type, grade, and class required to produce connections suitable for anchoring indicated items, including to other types of construction indicated.
- B. Stainless Steel Wire-Rope Fittings: Connectors of types indicated, fabricated from stainless steel, and with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.

## **2.6 COMPONENTS**

- A. Component Quality: Size, thicknesses, and materials with not less than strength and durability properties required by delegated engineering.
- B. Davit Base:
1. Roof Mounted: Assembly composed of welded steel plates and steel pipe suitable for bolted or welded anchoring to building roof structure; capable of receiving and supporting davit arms and socket housing; galvanized after fabrication.
  2. Wall Mounted: Assembly composed of welded steel plates and steel pipe suitable for bolted or welded anchoring to building wall or parapet; capable of receiving and supporting davit arms and socket housing; galvanized after fabrication.
- C. Davits:
1. Arms: High profile type tall enough to allow platform to be swung over building parapet into working position and back.
    - a. Assembly composed of treated structural aluminum sections of sufficient length and size equipped with carrying handles to allow movement to be accomplished by not more than 2 people.
    - b. Capable of rotating 360 degrees.
    - c. Permanently attached bearing assembly consisting of cast aluminum housing and bearing system transmitting bending and vertical load to socket housing.
    - d. Separate mechanical safety cable mounted in davit between wire rope rigging point and davit bearing block.
    - e. Rotation locks.
  2. Socket Housing: Assembly composed of welded steel plates and hard rubber wheel suitable for moving from davit base to davit base; capable of receiving and supporting davit arms; galvanized after fabrication.

3. Data Plate: Permanent, non-corrosive plate clearly stating maximum service capacity and allowable number of users; prominently displayed at access points to system.
- D. Safety Tiebacks:
1. Wall Mounted: Minimum 3/4 in (19 mm) diameter stainless steel bar, formed in minimum 1- 1/2 in (38 mm) U-shape eye opening, welded to stainless steel base plate suitable for bolted mounting indicated.
  2. Roof Mounted: Minimum 3/4 in (19 mm) diameter stainless steel bar, formed in minimum 1-1/2 in (38 mm) U-shape eye opening, welded to stainless steel cap attached to galvanized steel pipe; field welded to either steel building structure, or steel embed plates in concrete.
- E. Rigging Sleeves: Galvanized steel pipe, not less than 6 in (150 mm) inside diameter, with flanges for mounting indicated, with removable galvanized steel cap assembly tethered to pipe assembly.
- F. Intermittent Stabilization Anchors:
1. Surface Mounted Buttons: Exposed stainless steel rod with button-like head with threaded anchoring device of size and configuration for attachment to building facade.
  2. Recessed Mounted Detent Pins: Recessed stainless steel insert with outside end machined to receive detent pin and inside end with threaded anchoring device of size and configuration for attachment to building facade.
- G. "Hands Free" Horizontal Cable Lifeline System: Assembly composed of following components:
1. Cable: Stainless steel wire with permanently swaged ends.
  2. End Terminal: Stainless steel swaged termination at one end and stainless steel tensioner with shock absorber at other end.
  3. Mounting Devices: Stainless steel shape as required by mounting conditions.
  4. Cable Runner: Stainless steel device with automatic runner bypass for continuous "hands free" operation that can be inserted or removed anywhere on cable.
  5. Data Plate: Permanent, non-corrosive plate clearly stating maximum service capacity and allowable number of users; prominently displayed at access points to system.
  6. Harness: Manufacturer's standard "Hands-free" full body harness and lanyard complete with shock absorber.
- H. Monorails: Horizontal with manual or electric traversing trolleys composed of following components:
1. Track: Extruded aluminum profile with end caps, splice devices, expansion connections and other items as required for complete assembly; clear anodized finish.
  2. Mounting Brackets:
    - a. Exposed: Standard or custom configuration.
    - b. Concealed: Steel or aluminum of configuration required.
  3. Manual Traversing Trolleys: Stainless steel or cadmium plated steel suspension assembly with 4 traversing and 2 guide molded polymer wheels on hardened steel bearings; including locking device, safety and primary suspension points, and other items as required for complete assembly.

4. Powered Traversing Trolleys: Stainless steel encased geared motor, connected to manual traversing trolleys, with pinion engaging chain within track; including primary brake, overspeed brake, limits, controls, overload switch, thermal overload protection device, and other items as required for complete assembly; voltage as indicated on Electrical Drawings.
5. Data Plate: Permanent, non-corrosive plate clearly stating maximum service capacity and allowable number of users; prominently displayed at access points to system.

I. Vertical Personnel Access:

1. Cage: Rigid assembly fabricated of structural aluminum and galvanized steel consisting of following characteristics and components:
    - a. Nominal 30 in (750 mm) by 36 in (900 mm) plan dimensions.
    - b. Gross load capacity of not less than 1,250 pounds (565 kg).
    - c. Non-slip aluminum deck.
    - d. Tubular aluminum guardrails 42 in (1050 mm) high, with access gate.
    - e. Sheet aluminum toeboards around base of deck.
    - f. Self-contained, load-sensitive traction hoist below deck for controlled ascent and descent; including primary brake, overspeed brake, limits, controls, overload switch, thermal overload protection device, and other items as required for complete assembly; travel speed not less than 25 ft (7.5 m) per minute; voltage as indicated on Electrical Drawings.
  2. Cable: Stainless steel wire with permanently swaged ends.
  3. Minimum Controls:
    - a. Up and down operation buttons.
    - b. Variable speed control.
    - c. Emergency stop button.
    - d. Power on indicator light.
    - e. Meter that records operating time.
    - f. Hand crank for emergency descent in case of power failure.
  4. Remote Control: Same controls as on cage in lockable cabinets located as directed by Owner or Architect; separate controls for each cage.
- J. Accessories: Stainless steel brackets, shims, clips, and other items as required for complete assemblies. Pins and fittings subject to removal secured by wire rope lanyards.

## 2.7 FABRICATION

- A. Shop Assembly: Preassemble components in shop to greatest extent possible.
- B. Cutting and Forming:
  1. Cut, drill, and punch metals cleanly and accurately.
  2. Remove burrs and ease edges to a radius of approximately 1/32 in (0.8 mm), unless otherwise indicated.
  3. Remove sharp or rough areas on exposed surfaces.
  4. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing Work.

5. Form exposed Work true to line and level with accurate angles and surfaces and straight edges.

C. Welding:

1. Weld continuously using materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Assembling:

1. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.
2. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated.
3. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water; provide weep holes where water may accumulate.

## **2.8 FINISHES**

- A. Clear Anodized Aluminum Finish: AA-M12C22A41 (Mechanical Finish: as fabricated, nonspecular; Chemical Finish: etched, medium matte; Anodic Coating: Class I Architectural, clear film thicker than 0.7 mil) complying with AAMA 611, Class 1.
- B. Galvanized Steel: After fabrication of component, apply zinc-coating by hot-dip process complying with following requirements:
  1. ASTM A 153 / A 153M for galvanizing iron and steel hardware.
  2. ASTM A 123 / A 123M for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 in (0.7 mm) thick and heavier.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform building maintenance equipment Work according to following, unless otherwise specified:
  1. Respective manufacturer/fabricator's installation written instructions.

2. Accepted submittals.
3. Contract Documents.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer/fabricator's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

### **3.4 INSTALLATION OF BUILDING MAINTENANCE EQUIPMENT**

- A. Install components in locations shown on shop drawings in plumb and true vertical and horizontal alignment.

### **3.5 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.
  1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.
- B. Load Testing: After installation, conduct full live load and operational tests under maximum design live loading conditions, according to ANSI/IWCA I-14.1. Operate over full range (horizontally and vertically) of building surfaces for which equipment was intended to maintain.
- C. Repairs and Corrections: Correct component deficiencies to assure compliance. Retesting and/or reinspection failing to meet specified requirements shall be done at no additional cost to Owner.

### **3.6 DEMONSTRATION**

- A. Operational and Maintenance Training: Provide on-site instruction by factory-trained and certified technicians for Owner's personnel. Provide bound copies of training materials for each attendee.

**END OF SECTION**

## **SECTION 11 5213**

### **PROJECTION SCREENS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Perform work required to complete the projection screens indicated by the contract documents and furnish supplementary items necessary for their proper installation.

##### **1.2 ACTION SUBMITTALS**

- A. Samples: Submit for approval samples of screen materials showing construction and finish specified.
- B. Shop Drawings: Submit manufacturer's literature and mark sufficiently to indicate compliance with these specifications. Show locations, methods of supporting, methods of anchoring and finishes of each projection screen.

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

##### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
  - 1. Da-Lite Screen Company
  - 2. Draper Inc.
  - 3. Stewart Filmscreen Corporation

##### **2.2 MATERIALS**

- A. Projection Screens (Electrically Operated): Da-Lite Screen Co., Inc., "Professional Electrol" Automatic Electric Projection Screen, size as indicated on the drawings.
  - 1. Screen shall be electrically operated with a 120 volt AC (60 Hz) 2.4 amp, three (3) wire quick reversal motor, especially designed for the purpose. Motor shall be ball bearing type, and oiled for life, with automatic thermal overload cut-out and integral interlocking gears.
  - 2. Screen operating system shall have pre-set but accessible limit switches to automatically stop screen fabric in the "up" and "down" positions. Stop action shall be positive, to prevent coasting.
  - 3. System shall include a rigid metal roller at least 3 in (75 mm) diameter (to be used for screens 12' or less in width), or 5-3/4 in (142 mm) diameter (to be used on screens 14' to 18' in width), or 7 in (175 mm) diameter (to be used on screens where either height or width exceeds 20'). Roller shall be mounted on two cast aluminum brackets equipped with self-aligning bearings.

4. Screen surface shall be flame retardant and mildew resistant, black masking borders, and with the following viewing surface:
    - a. Matte white.
  5. Case shall be of wood with double top for extra rigidity and sound deadening.
  6. Case shall be finished with a primer coat, ready to accept final finish by others.
  7. Heavy metal adjustable brackets shall be furnished for mounting screen as follows:
    - a. Ceiling.
    - b. Walls.
    - c. Structure above ceiling.
  8. System shall be complete with three (3) position control switch in box with cover plate.
  9. The complete screen unit shall be "Listed by Underwriters' Laboratories, Inc.", and shall bear the re-examination markers of the Underwriters' Laboratories, Inc.
- B. Projection Screens (Manually Operated): Da-Lite Screen Co., Inc. Model "Video B", manually operated spring roller type Screen, size(s) as indicated.
1. Case: Heavy gage octagon shape steel case with flat back design with baked enamel finish, fitted with heavy duty chrome case end caps concealing roller ends with integral bearing surface or steel inner caps to support roller.
  2. Mounting Brackets: Plated steel brackets attached to end caps for wall mounting by means of slotted screw holes and ceiling mounted by means of plated steel hanger rings. Furnish heavy angle adjustable steel extension wall brackets.
  3. Screen Fabric:
    - a. Viewing surface shall be as follows with masking borders on flame retardant and mildew resistant fabric.
      - 1) Matte white.
      - 2) Glass-beaded.
    - b. Bottom of fabric shall be mounted into a metal strip in a tubular steel slat finished in baked enamel. Ends of slat shall be protected by plastic caps.
    - c. Fabric shall be mounted into a metal strip in a metal "camlok" roller system without tape, glue, staples or cords, so that fabric may be easily replaced yet, cannot be pulled from roller.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Installation shall be as indicated on the Drawings.
- B. Installation shall be in accordance with the manufacturer's latest published requirements, specifications and details.

## **END OF SECTION**

**SECTION 11 7000**  
**MEDICAL EQUIPMENT**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Work of this Section includes related wall support, mechanical and electrical connections for medical equipment provided by Owner.
- B. Medical equipment information at the end of this Section is for reference only.

**1.2 ACTION SUBMITTALS**

- A. Product Data: Furnished by Owner.
- B. Shop Drawings: Contractor shall furnish shop drawings of equipment installation when necessary to ensure coordination of the Work.

**PART 2 - PRODUCTS**

**2.1 OWNER FURNISHED / OWNER INSTALLED EQUIPMENT**

- A. Products: Identified as "OFOI". Product is provided by Owner and installed by Owner.
- B. Contractor Responsibilities: Limited to interface, surface preparations and utilities indicated on the Drawings or specified in the Specifications.

**2.2 OWNER FURNISHED / CONTRACTOR INSTALLED EQUIPMENT**

- A. Products: Identified as "OFCI". Product is provided by Owner and installed by the Contractor.
- B. Contractor Responsibilities: Provide labor, transportation, materials, tools, appliances and utilities necessary for the following:
  - 1. Transportation of product from Owner's facility to the job site.
  - 2. Receiving and storage of product.
  - 3. Installation of product, complete and in operating condition, including adjusting and calibration of product as necessary for proper operation.
  - 4. Testing of product.
  - 5. Paying of fees, licenses, and taxes in conjunction with installation of the product.
  - 6. Roughing-in and final utility connections for product remain the work of specification sections governing the specific utility.

**2.3 CONTRACTOR FURNISHED / CONTRACTOR INSTALLED EQUIPMENT**

- A. Products: Identified as "CFCI". Product is provided by Contractor and installed by Contractor.

- B. Contractor Responsibilities: Furnish equipment and installation as indicated in other specification sections.

## **2.4 OWNER FURNISHED / VENDOR INSTALLED EQUIPMENT**

- A. Products: Identified as "OFVI". Product provided by Owner, and installed by Owner's vendor.
- B. Contractor Responsibilities: Limited to interface, surface preparations and utilities indicated on the Drawings or specified in the Specifications.

## **2.5 FUTURE EQUIPMENT**

- A. Products: Identified as "Future". Product provided by Owner and installed by others in the future.
- B. Contractor Responsibilities: Limited to interface, surface preparations and utilities indicated on the Drawings or specified in the Specifications.

# **PART 3 - EXECUTION**

## **3.1 EXAMINATION**

- A. For Contractor installed medical equipment, examine substrate surfaces to receive medical equipment and associated work and conditions under which work will be installed. Do not proceed until unsatisfactory conditions have been corrected in a manner acceptable to the Installer. Starting of work within a particular area will be construed as installer's acceptance of surface conditions.

## **3.2 PREPARATION**

- A. Coordinate work of this Section with related work of other Sections to obtain proper installation of items. Become acquainted with the work of other Sections whose work abut, adjoin or are in any way affected by or related to work under this Section.
- B. Carefully examine the drawings and directions and be responsible for proper installation of materials and product without substantial changes.
- C. Indication of pipe connection sizes on the plans shall in no way relieve Contractor of the responsibility of checking and verifying their sizes and locations from the actual product to be installed and any available roughing-in diagrams.

## **3.3 SCOPE OF WORK**

- A. Back-up Support: Provide wall reinforcing, backing and bracing for wall mounted equipment.
- B. Concrete: Provide work indicated or required including, but not limited to, the following:
  - 1. Housekeeping pads.
  - 2. Trenches.
  - 3. Anchor bolts.
  - 4. Vibration isolation devices.
  - 5. Core drilling.

6. Sleeves.

C. Heating, Ventilating, and Air Conditioning (HVAC): Provide work indicated or required including, but not limited to, exhaust ducts from connection point of equipment to building exhaust system.

D. Plumbing: Provide work indicated or required, including, but not limited to, the following:

1. Devices such as vacuum breakers, pressure reducing valves, shut-off valves, trim, traps, filters, etc.
2. Water, waste, gas, air, and steam connections to equipment.

E. Electrical: Provide work indicated or required including, but not limited to, the following:

1. Wiring and devices.
2. Power and lighting service.
3. Connections to equipment.

### **3.4 SCHEDULE OF MEDICAL EQUIPMENT**

A. Refer to separately bound document.

**END OF SECTION**

**17-13 OSU, College of Osteopathic Medicine at  
Cherokee Nation  
Childers Architect  
2019-07-26**

**MEDICAL EQUIPMENT**

**SECTION 12 2413**  
**ROLLER WINDOW SHADES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes: Roller window shades and supplementary items necessary to complete their installation.
  - 1. Manually operated roller shades.
  - 2. Motor-operated roller shades.
- B. Related Requirements:
  - 1. Motorized Units: Division 26 Sections for electrical service and connections for motor operators, controls, limit switches, and other powered devices and for system disconnect switches for motorized shade operation.

**1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.
- B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.
  - 1. Motor-Operated Shades: Include details of installation and diagrams for power, signal, and control wiring.
- C. Samples for Verification: For each type of roller shade.
  - 1. Shadeband Material: Not less than 10 in (250 mm) square. Mark inside face of material if applicable.
  - 2. Roller Shade: Full-size operating unit, not less than 16 in (400 mm) wide by 36 in (900 mm) long for each type of roller shade indicated.
  - 3. Installation Accessories: Full-size unit, not less than 10 in (250 mm) long.
- D. Roller-Shade Schedule: Use same designations indicated on Drawings.

**1.3 INFORMATIONAL SUBMITTALS**

- A. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.

- B. Product Test Reports: For each type of shadeband material, written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
- C. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".
- D. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.
- E. Warranty: Sample of warranty.
  - 1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

#### **1.4 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For roller shades to include in maintenance manuals.
  - 1. Methods for maintaining roller window shades and finishes.
  - 2. Precautions about cleaning materials and methods that could be detrimental to fabrics, finishes, and performance.
  - 3. Operating hardware.
  - 4. Motorized shade operator.

#### **1.5 MAINTENANCE MATERIAL SUBMITTALS**

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Rollers Shades: Before installation begins, for each size, color, texture, and pattern indicated, full-size units equal to 5 percent of amount installed, but not fewer than 2 units.

#### **1.6 QUALITY ASSURANCE**

- A. Installer Qualifications: Fabricator of products.
  - 1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  - 2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
  - 3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.
- B. Mock-ups: Prior to fabrication and installation, build mock-up for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up using materials indicated for the completed Work.

1. Build mock-up in the location and of the size indicated or, if not indicated, as directed by Architect. Contractor shall provide structural support framework.
  - a. Show typical components, attachments to building structure, and requirements of installation.
2. Notify Architect seven days in advance of the dates and times when mock-up will be installed.
3. Obtain Architect's acceptance of mock-ups before starting fabrication or installation.
4. Acceptance of mock-ups does not constitute acceptance of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically noted by Contractor and accepted by Architect in writing.
5. Demolish and remove mock-ups when directed by Architect unless accepted to become part of the completed Work.

## **1.7 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.
  1. Participants:
    - a. Architect.
    - b. Contractor, including superintendent.
    - c. Installer, including project manager and supervisor.
    - d. If requested, Manufacturer/fabricator's qualified technical representative.
    - e. Installers of other construction interfaced with Work.
  2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
    - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
    - b. Review Contract Document Requirements.
    - c. Review approved submittals.
    - d. Review inspection and testing requirements.
    - e. Review environmental conditions and procedures for coping with unfavorable conditions.
    - f. Resolve deviations or differences between Contract Documents and the manufacturer/fabricator's specifications.
  3. Record discussions, including decisions and agreements reached and prepare report.

## **1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

## **1.9 FIELD CONDITIONS**

- A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

- B. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

#### **1.10 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

#### **1.11 WARRANTY**

- A. Manufacturer's Warranty: Furnish manufacturer's written material and labor warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design and installation of product. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

1. Coverage of warranty includes but is not limited to the following:
  - a. Fabric failure includes deterioration, sag, warp, fade or will not remain fit for use.
2. Warranty Period: Manufacturer shall warrant the products to be free from material and labor Defects for the following periods from date of Substantial Completion
  - a. Manual operating components: 10 years.
  - b. Shade Cloth: 10 years.
  - c. Motors and electronic components: 5 years.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
  1. Draper Inc.
  2. Hunter Douglas Contract.
  3. Lutron Electronics Co., Inc.
  4. Mariak Contract
  5. MechoShade Systems, Inc.
- B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.
  1. Manufacturer and Product: As scheduled or as indicated in Design Selections.

## **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

## **2.3 SHADE SCHEDULE**

- A. RS-01 - Shade Type 1: Manual operating, chain drive, light filtering shadebands.
- B. RS-02 - Shade Type 2: Manual operating, chain drive, light blocking shadebands.
- C. RS-03 - Shade Type 3: Manual operating, chain drive double roller, inside light filtering shadebands, outside light blocking shadebands, operating independently of each other. Include related mounting systems and accessories.
- D. RS-04 - Shade Type 4: Motorized, light filtering shadebands. Include related motor control systems.
- E. RS-05 - Shade Type 5: Motorized. Light blocking shadebands. Include related motor control systems.
- F. RS-06 - Shade Type 6: Motorized, double roller, inside light filtering shadebands, outside light blocking shadebands, operating independently of each other. Include related motor control systems.

## **2.4 MANUALLY OPERATED SHADES**

- A. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.
  - 1. Bead Chains: Manufacturer's standard, Stainless steel.
    - a. Loop Length: Full length of roller shade, unless otherwise indicated.
    - b. Limit Stops: Provide upper and lower ball stops.
    - c. Chain-Retainer Type: Clip, Chain tensioner and mounting as selected by Architect.
  - 2. Spring Lift-Assist Mechanisms: Manufacturer's standard for balancing roller-shade weight and lifting heavy roller shades.
    - a. Provide for shadebands that weigh more than **10 lb (4.5 kg)** or for shades as recommended by manufacturer, whichever criteria are more stringent.
- B. Rollers - Single: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
  - 1. Roller Drive-End Location: As indicated on Drawings.
  - 2. Direction of Shadeband Roll: Regular, from back of roller, unless otherwise indicated.
  - 3. Shadeband-to-Roller Attachment: Manufacturer's standard method.

- C. Rollers - Double: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
1. Double-Roller Mounting Configuration: Offset, outside roller over and inside roller under, unless otherwise indicated.
  2. Inside Roller:
    - a. Drive-End Location: As indicated on Drawings.
    - b. Direction of Shadeband Roll: Regular, from back of roller.
  3. Outside Roller:
    - a. Drive-End Location: As indicated on Drawings.
    - b. Direction of Shadeband Roll: Reverse, from front of roller
  4. Shadeband-to-Roller Attachment: Manufacturer's standard method.

## **2.5 MOTOR-OPERATED**

- A. Motorized Operating System: Provide factory-assembled, shade-operator system of size and capacity and with features, characteristics, and accessories suitable for conditions indicated, complete with electric motor and factory-prewired motor controls, power disconnect switch, enclosures protecting controls and operating parts, and accessories required for reliable operation without malfunction. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system.
1. Electrical Components: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  2. Electric Motor: Manufacturer's standard tubular, enclosed in roller.
    - a. Electrical Characteristics: Single phase, 110 V, 60 Hz, unless recommended otherwise by manufacturer.
  3. Remote Control: Electric controls with NEMA ICS 6, Type 1 enclosure for recessed or flush mounting. Provide the following for remote-control activation of shades:
    - a. Individual Switch Control Station: Momentary-contact, three -position, rocker-style, wall-switch-operated control station with open, close, and center off functions.
    - b. Group Control Station: Momentary-contact, three-position, rocker-style, wall-switch-operated control station with open, close, and center off functions for single-switch group control.
    - c. Individual/Group Control Station: Momentary-contact, three-position, rocker-style, wall-switch-operated control station with open, close, and center off functions for individual and group control.
    - d. Color: As selected by Architect from manufacturer's full range.
  4. Limit Switches: Adjustable switches interlocked with motor controls and set to stop shades automatically at fully raised and fully lowered positions.
  5. Operating Features:

- a. Group switching with integrated switch control; single faceplate for multiple switch cutouts.
  - b. Capable of interface with audiovisual control system.
  - c. Override switch, if applicable.
- B. Rollers - Single: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
  - 1. Roller Drive-End Location: As indicated on Drawings.
  - 2. Direction of Shadeband Roll: Regular, from back of roller, unless otherwise indicated.
  - 3. Shadeband-to-Roller Attachment: Manufacturer's standard method.
- C. Rollers - Double: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
  - 1. Double-Roller Mounting Configuration: Offset, outside roller over and inside roller under, unless otherwise indicated.
  - 2. Inside Roller:
    - a. Drive-End Location: As indicated on Drawings.
    - b. Direction of Shadeband Roll: Regular, from back of roller.
  - 3. Outside Roller:
    - a. Drive-End Location: As indicated on Drawings.
    - b. Direction of Shadeband Roll: Reverse, from front of roller
  - 4. Shadeband-to-Roller Attachment: Manufacturer's standard method.

## **2.6 SHADEBANDS AND ACCESSORIES**

- A. Shadebands – Single Roller:
  - 1. Shadeband Material: Refer to Shade Schedule for type. Color as scheduled or as indicated in Design Selections.
  - 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
    - a. Type: Enclosed in sealed pocket of shadeband material, unless otherwise indicated.
    - b. Color and Finish: As selected by Architect from manufacturer's full range.
- B. Inside Shadebands – Double Roller:
  - 1. Shadeband Material: Refer to Shade Schedule for type. Color as scheduled or indicated in Design Selections.
  - 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
    - a. Type: Enclosed in sealed pocket of shadeband material
    - b. Color and Finish: As selected by Architect from manufacturer's full range

- C. Outside Shadebands – Double Roller:
  - 1. Shadeband Material: Refer to Shade Schedule for type. Color as scheduled or indicated in Design Selections.
  - 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
    - a. Type: Exposed with endcaps and integral light seal with bottom (sill) channels.
    - b. Color and Finish: As selected by Architect from manufacturer's full range.
- D. Installation Accessories:
  - 1. Exposed Headbox: Rectangular, extruded-aluminum enclosure including front fascia, top and back covers, endcaps, and removable bottom closure.
    - a. Height: Manufacturer's standard height required to enclose roller and shadeband when shade is fully open, but not less than **4 in (100 mm)**.
  - 2. Endcap Covers: To cover exposed endcaps.
  - 3. Bottom (Sill) Channel or Angle: With light seals and designed to eliminate light gaps at bottoms of shades when shades are closed.
  - 4. Installation Accessories Color and Finish: As selected from manufacturer's full range.
- E. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller mounting configuration, roller assemblies, operating mechanisms, installation accessories, and installation locations and conditions indicated.
- F. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.

## 2.7 SHADEBAND MATERIALS

- A. Shadeband Material Flame-Resistance Rating: Comply with NFPA 701. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- B. Shade Band Material: Manufacturer's standard PVC-free shade band material.

## 2.8 ROLLER-SHADE FABRICATION

- A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):
  - 1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 in (6 mm) per side or 1/2 in (12 mm) total, plus or minus 1/8 in (3 mm). Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 in (6 mm), plus or minus 1/8 in (3 mm).
- C. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible except as follows:

1. Vertical Shades: Where width-to-length ratio of shadeband is equal to or greater than 1:4, provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material. Obtain approved locations from Architect prior to fabrication.
2. Railroaded Materials: Railroad material where material roll width is less than the required width of shadeband and where indicated. Provide battens and seams as required by railroaded material to produce shadebands with full roll-width panel(s) plus, if required, one partial roll-width panel located at top of shadeband.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

### **3.3 ROLLER-SHADE INSTALLATION**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  1. Respective manufacturer/fabricator's written installation instructions.
  2. Accepted submittals.
  3. Contract Documents.
- B. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.
  1. Opaque Shadebands: Located so shadeband is not closer than 2 in (50 mm) to interior face of glass. Allow clearances for window operation hardware.
- C. Electrical Connections: Connect motor-operated roller shades to building electrical system.

### **3.4 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.

1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.

### **3.5 ADJUSTING**

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

### **3.6 CLEANING AND PROTECTION**

- A. Clean roller-shade surfaces after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

### **3.7 DEMONSTRATION**

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain motor-operated roller shades.

### **3.8 FINISH SCHEDULE**

- A. See Interior Finish Legend on drawings.

## **END OF SECTION**

## **SECTION 12 3571**

### **STAINLESS STEEL CASEWORK**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section includes stainless-steel healthcare casework and supplementary items necessary for installation for the following:
  - 1. Stainless steel casework.
  - 2. Stainless-steel countertops, shelves, and sinks.
  - 3. Specialty Cabinets:
    - a. Narcotics Cabinets.
    - b. Specimen Pass-Through Cabinets.
    - c. Warming Cabinets.
    - d. Desk Units.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work.
  - 1. Indicate locations of blocking and reinforcements required for installing casework.
  - 2. Indicate hardware locations.
  - 3. Indicate locations of and clearances from adjacent walls, doors, windows, other building components, and equipment.
  - 4. Include coordinated dimensions for equipment specified in other Sections.
- C. Keying Schedule: Include schematic keying diagram, and index each key set to unique designations that are coordinated with the Contract Documents.
- D. Samples for Verification: For each type of exposed hardware indicated, in full-size units.

##### **1.3 INFORMATIONAL SUBMITTALS**

- A. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.

#### **1.4 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.
- B. Installer Qualifications:
  - 1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
  - 2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.

#### **1.5 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.
- B. Keying Conference: Conduct conference at Project site. Incorporate keying conference decisions into final keying requirements.

#### **1.6 PROJECT CONDITIONS**

- A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

#### **1.7 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

#### **1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Protect finished surfaces during handling and installation with protective covering of polyethylene film or other suitable material.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
- B. Available Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those listed.
  - 1. Jamestown Metal Products.
  - 2. MASS Medical Storage.
  - 3. STERIS Corporation.

## **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

## **2.3 CASEWORK MATERIALS**

- A. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, stretcher-leveled standard of flatness.
- B. Nominal Stainless-Steel Thicknesses for Stainless-Steel Healthcare Casework:
  - 1. Sides, Ends, Fixed Backs, Bottoms, Cabinet Tops, Soffits, and Items Not Otherwise Indicated: 0.050 in (1.25). Bottoms may be 0.038 in (0.95 mm) if reinforced.
  - 2. Back Panels, Doors, Drawer Fronts and Bodies, and Shelves: 0.038 in (0.95 mm) except 0.050 in (1.25 mm) for unreinforced shelves more than 36 in (900 mm) long.
  - 3. Intermediate Horizontal Rails, Center Posts, Tubular Legs, and Top Gussets: 0.062 in (1.59 mm).
  - 4. Drawer Runners and Hinge Reinforcements: 0.078 in (1.9 mm).
  - 5. Leveling and Corner Gussets: 0.109 in (2.7 mm).
- C. Glass for Glazed Doors: Clear tempered glass complying with ASTM C 1048, Kind FT, Condition A, Type I, Class 1, Quality-Q3; not less than 5.0 mm thick.
- D. Clear Tempered Glass Shelves: ASTM C 1048, Kind FT, Condition A, Type I, Class 1, Quality-Q3; 6.0 mm thick; with exposed edges seamed before tempering.
- E. Pegboard: Provide one or both of the following types as indicated on drawings:
  - 1. Type 1: 1/4 in (6 mm) perforated hardboard, complying with ANSI A135.4, Class 1 tempered; with painted finish sealing faces, edges, and perimeter of holes.
  - 2. Type 2: Perforated stainless-steel sheet, 0.050 in (1.25 mm) nominal thickness.
- F. Insulation for Warming Cabinets: Semirigid, glass-fiber board insulation complying with ASTM C 612, Type IA or Type IB.
- G. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

## **2.4 CABINET FABRICATION**

- A. General: Assemble and finish units at point of manufacture. Use precision dies for interchangeability of like-size drawers, doors, and similar parts. Perform assembly on precision jigs to provide units that are square. Reinforce units with angles, gussets, and channels. Integrally frame and weld to form a dirt- and vermin-resistant enclosure. Maintain uniform clearance around door and drawer fronts of 1/16 to 3/32 in (1.5 to 2.4 mm).
- B. Metal Flush Doors: Outer and inner pans that nest into box formation, with full-height channel reinforcements at center of door. Fill doors with noncombustible, sound-deadening material.
- C. Glazed Doors: Hollow-metal stiles and rails of similar construction as flush doors, with glass held in resilient channels or gasket material.

- D. Hinged Doors: Mortise doors for hinges and reinforce with angles welded inside inner pans or hollow-metal stiles at hinge edge.
- E. Metal Drawers: Fronts made from outer and inner pans that nest into box formation, with no raw metal edges at top. Sides, back, and bottom fabricated in one piece with rolled or formed top of sides for stiffening and comfortable grasp for drawer removal.
- F. Metal Shelves: Front, back, and ends formed down, with edges returned horizontally at front and back to form reinforcing channels. Provide clips, brackets, pilasters, or other means to support shelves from cabinet ends and to allow height of shelves to be adjusted in increments of not more than 2 in (50 mm).
- G. Sloping Tops: Unless tops are concealed by other construction, provide sloping tops on cabinets with tops 60 in (1500 mm) or more above the finished floor. Slope tops 25 degrees or more and construct of same material and with same finish as cabinets.
- H. Toe Space: Unless casework is built-in, provide metal toe space, fully enclosed, 4 in (100 mm) high by 3 in (75 mm) deep, with no open gaps or pockets.
- I. Filler Strips: Provide as needed to close spaces between cabinets and walls, ceilings, and indicated equipment. Fabricate from same material and with same finish as cabinets and with hemmed or flanged edges.
- J. Trim Flanges: Formed metal trim fabricated from same material and with same finish as cabinets. Provide at perimeter of recessed cabinets.

## **2.5 STAINLESS-STEEL COUNTERTOPS, SHELVES, AND SINKS**

- A. Countertops: Fabricate from 0.062 in (1.59 mm) thick, stainless-steel sheet. Provide smooth, clean exposed tops and edges in uniform plane, free of defects. Provide front and end overhang of 1 in (25 mm) over the base cabinets.
  - 1. Joints: Fabricate countertops without field-made joints.
  - 2. Weld shop-made joints.
  - 3. Sound-deaden the undersurface with heavy-build mastic coating.
  - 4. Extend the top down to provide a 1 in (25 mm) thick edge with a 1/2 in (12 mm) return flange.
  - 5. Form the backsplash coved to and integral with top surface, with a 1/2 in (12 mm) thick top edge and 1/2 in (12 mm) return flange.
  - 6. Provide raised (marine) edge around perimeter of tops containing sinks; pitch tops containing sinks two ways to provide drainage without channeling or grooving.
  - 7. Where stainless-steel sinks occur in stainless-steel tops, factory weld into one integral unit.
- B. Wall-Mounted Shelves: Fabricate from stainless-steel sheet, not less than 0.050 in (1.25 mm) nominal thickness. Weld shop-made joints. Fold down or up, as indicated on drawings, the front edge a minimum of 3/4 in (19 mm); fold up the back edge a minimum of 3 in (75 mm). Provide integral stiffening brackets, formed by folding up ends a minimum of 3/4 in (19 mm) and by welding to upturned back edge.
- C. Stainless-Steel Sinks: Fabricate from stainless-steel sheet, not less than 0.050 in (1.25 mm) nominal thickness. Fabricate with corners rounded and coved to at least 5/8 in (15 mm) radius. Slope the sink bottoms to outlet without channeling or grooving. Provide continuous butt-welded joints.

1. Provide sizes indicated or manufacturer's closest standard size of equal or greater volume, as approved by Architect.
2. Provide double-wall construction for sink partitions with top edge rounded to at least 1/2 in (12 mm) diameter.
3. Factory punch holes for fittings.
4. Provide sinks with stainless-steel strainers and tailpieces.
5. Provide sinks with integral rims except where located in stainless-steel countertops.
6. Apply 1/8 in (3 mm) thick coating of heat-resistant, sound-deadening mastic to undersink surfaces.

## **2.6 SPECIALTY CABINETS**

- A. Narcotics Cabinets: Construct of stainless steel as individual, freestanding units with finished sides and top and double-walled bottom. Provide with double-pan flush outer door and 0.062 in (1.59 mm) nominal thickness, single-pan inner door, both with locks; each is individually keyed and not master keyed.
- B. Specimen Pass-Through Cabinets: Construct of stainless steel as through-wall units with double-walled construction and smooth interior. Provide with double-pan flush doors with interlocking hardware that prevents each door from being opened when the other door is open. Provide with removable, stainless-steel spill tray and trim flanges for both faces.
- C. Warming Cabinets: Recessed units covered on back, top, and sides with 1 in (25 mm) thick insulation. Insulate double-pan door and equip with heat-resistant gasket. Provide with thermostatically controlled heating system to maintain temperature within 10 deg. F (-9.4 deg. C) of temperature setting that can be varied from 97 to 160 deg. F (36 to 71 deg. C).
  1. Equip units with fan-forced electric heating system.
- D. Desk Units: Recessed units with sloped stainless-steel writing surface, magnetic stainless-steel back panel, and built-in fluorescent light fixture.
  1. Provide drawers under the writing surface as indicated.
  2. Provide keyboard drawer under the writing surface and provide drawers and space for CPU under keyboard drawer as indicated. Provide rack or articulated arm, as indicated on drawings, for monitor over the writing surface.

## **2.7 STAINLESS-STEEL FINISH**

- A. Grind and polish surfaces to produce uniform, directional-satin finish matching No. 4 finish, with no evidence of welds and free of cross scratches. Run grain with long dimension of each piece. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces clean.

## **2.8 CABINET HARDWARE**

- A. General: Provide healthcare casework manufacturer's standard, commercial-quality, heavy-duty hardware complying with requirements indicated for each type.
- B. Hinges: Stainless-steel, five-knuckle hinges complying with BHMA A156.9, Grade 1, with antifriction bearings and hospital tips. Provide two hinges for doors 48 in (1200 mm) high or less, and provide three for doors more than 48 in (1200 mm) high.

- C. Continuous Hinges: Stainless-steel continuous hinges complying with BHMA A156.9, Grade 1. Provide for specialty cabinets.
- D. Hinged Door and Drawer Pulls: Back-mounted pulls of stainless steel.
  - 1. Design: As selected from manufacturer's full range.
  - 2. Overall Size: As selected from manufacturer's full range.
- E. Sliding Door Pulls: Recessed flush pulls of stainless steel or chrome plated. Provide two pulls for drawers more than 24 in (600 mm) wide.
  - 1. Design and Size: As selected from manufacturer's full range.
- F. Door Catches: Nylon-roller spring catches. Provide two catches on doors more than 48 in (1200 mm) high.
- G. Drawer Slides: Side-mounted, epoxy-coated-steel, self-closing, ball-bearing drawer slides; designed to prevent rebound when drawers are closed; complying with BHMA A156.9, Type B05091.
  - 1. Provide Grade 1 for drawers not more than 6 in (150 mm) high and 24 in (600 mm) wide.
  - 2. Provide Grade 1HD-100 for drawers more than 6 in (150 mm) high or 24 in (600 mm) wide.
  - 3. Provide Grade 1 for computer keyboard drawers.
  - 4. Provide full-extension type where Grade 1 is indicated.
  - 5. Provide full-extension type where Grade 1HD-100 or Grade 1HD-200 is indicated.
- H. Locks: Cam or half-mortise type; brass with chrome-plated finish; complying with BHMA A156.11, Type E07281, E07111, or E07021.
  - 1. Provide minimum of two keys per lock and two master keys.
  - 2. Provide locks where indicated.
  - 3. Keying: Key locks as directed.
  - 4. Master Key System: Key all locks to be operable by master key.
- I. Sliding-Door Hardware Sets: Healthcare casework manufacturer's standard, to suit type and size of sliding-door unit.

### **PART 3 - EXECUTION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer written installation instructions.

2. Accepted submittals.
3. Contract Documents.

- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

### **3.4 INSTALLATION OF CABINETS**

- A. Install cabinets level, plumb, and true; shim as required, using concealed shims. Where healthcare casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical. Do not exceed the following tolerances:
1. Variation of Tops of Base Cabinets from Level: 1/16 in in 10 feet (1.5 mm in 3 m).
  2. Variation of Bottoms of Upper Cabinets from Level: 1/8 in in 10 feet (3 mm in 3 m).
  3. Variation of Faces of Cabinets from a True Plane: 1/8 in in 10 feet (3 mm in 3 m).
  4. Variation of Adjacent Cabinet Surfaces from a True Plane (Lippage): 1/32 in (0.8 mm).
  5. Variation in Alignment of Adjacent Door and Drawer Edges: 1/16 in (1.5 mm).
- B. Recessed Cabinets: Set cabinets in openings and fasten to partition framing, wood blocking, or reinforcements in partitions with fasteners spaced not more than 24 in (600 mm) o.c. Bolt adjacent cabinets together with joints flush, tight, and uniform.
- C. Base Cabinets: Fasten cabinets to partition framing, wood blocking, or reinforcements in partitions with fasteners spaced not more than 16 in (400 mm) o.c. Bolt adjacent cabinets together with joints flush, tight, and uniform.
- D. Wall Cabinets: Fasten to hanging strips, masonry, partition framing, blocking, or reinforcements in partitions. Fasten each cabinet through the back, near the top, at not less than 16 in (400 mm) o.c.
- E. Install hardware uniformly and precisely. Set hinges snug and flat in mortises.
- F. Adjust healthcare casework and hardware so doors and drawers align and operate smoothly without warp or bind and so contact points meet accurately. Lubricate operating hardware as recommended by manufacturer.

### **3.5 INSTALLATION OF COUNTERTOPS**

- A. Install metal countertops level, plumb, and true; shim as required, using concealed shims.
- B. Field Jointing: Where possible, make field jointing in the same manner as shop jointing; use fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.

- C. Secure tops to cabinets with Z- or L-type fasteners or equivalent; use two or more fasteners at each front, end, and back.
- D. Abut top and edge surfaces in one true plane, with internal supports placed to prevent deflection.
- E. Seal junctures of tops, splashes, and walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.
- F. Wall-Mounted Shelves: Fasten to masonry, partition framing, blocking, or reinforcements in partitions. Fasten each shelf through upturned back edge at not less than 24 in (600 mm) o.c.

### **3.6 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs, recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.
  - 1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.

### **3.7 CLEANING AND PROTECTION**

- A. Repair or remove and replace defective work as directed on completion of installation.
- B. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.
- C. Protection: Provide 6 mil (0.15 mm) plastic or other suitable water-resistant covering over the countertop surfaces. Tape to underside of countertop at a minimum of 48 in (1220 mm) o.c. Remove protection at Substantial Completion.

**END OF SECTION**

## SECTION 12 3661

### SIMULATED STONE COUNTERTOPS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes: The following simulated stone countertops along with supplementary items necessary for installation:
  - 1. Solid surfacing countertops.
  - 2. Quartz agglomerate countertops.
  - 3. Cultured marble countertops.

##### 1.2 ACTION SUBMITTALS

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work. Show locations and sizes of cutouts and holes for plumbing fixtures, accessories and other items installed in countertops.
- C. Samples for Verification Purposes: For simulated stone material, 6 in (150 mm) square, showing color and pattern selected.

##### 1.3 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of warranty.
  - 1. Provide manufacturer's written warranty covering materials and installation (labor) stating obligations, remedies, limitations and exclusions.

##### 1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.

##### 1.5 PRE-INSTALLATION CONFERENCE

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

## **1.6 PROJECT CONDITIONS**

- A. Environmental Limitations: Do not deliver or install countertops until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

## **1.7 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

## **1.8 WARRANTY**

- A. Manufacturer's Warranty: Furnish manufacturer's written material and labor warranty signed by an authorized representative using manufacturer's standard form agreeing to furnish materials and labor required to repair or replace work which exhibits material defects caused by manufacture or design and installation of product. "Defects" is defined to include but not limited to deterioration or failure to perform as required.
  - 1. Warranty Period: Manufacturer shall warrant the products to be free from material and labor Defects for a period of 10 years from date of Substantial Completion

## **PART 2 - PRODUCTS**

### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
  - 1. Solid Surfacing Paneling.
    - a. Avonite Surfaces
    - b. E. I. du Pont de Nemours and Company
    - c. Formica Corporation
    - d. LG Chemical, Ltd.
    - e. Meganite Inc.
    - f. Samsung Chemical USA, Inc.
    - g. Swan Corporation (The)
    - h. Transolid, Inc.
    - i. Wilsonart International
- B. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.
  - 1. Color(s): As scheduled or as indicated in Interior Finish Schedule on drawings.

## **2.2 SIMULATED STONE COUNTERTOP MATERIALS**

- A. Solid Surface Material: Homogenous solid sheets of filled plastic resin complying with ANSI SS1.
- B. Panel Thickness: Minimum 1/2 in (12 mm) or as indicated on drawings.

## **2.3 ACCESSORIES**

- A. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded and other requirements as specified in Division 06 Section "Miscellaneous Rough Carpentry".
- B. Adhesives: Manufacturers recommended adhesive.
  - 1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
    - a. Not more than 250 g/L.
- C. Lavatory Bowls: Provide one or both types below, as indicated on drawings:
  - 1. Under-slung or Self-Rimming Lavatory Bowls: Where indicated, provide as specified in Division 22 Plumbing Sections.
- D. Backsplash: Preformed 4 in (100 mm) high coved backsplash, to match countertop.
- E. Front Edge Trim: Preformed 1-1/2 in (38 mm), to match countertops.
- F. Accessories: Provide joint seam adhesives and other items required for a complete installation as recommended in writing by simulated stone manufacturer.
- G. Sealant: Mildew resistant silicone sealant as specified in Division 07 Section "Joint Sealants".

## **2.4 FABRICATION OF SIMULATED STONE COUNTERTOPS**

- A. Accurately cut holes and drill countertop panels to receive plumbing, fixtures, soap dispensers and other accessories. Obtain field measurements prior to fabrication and maintain minimum clearance at walls.
- B. Fabricate tops in one piece with shop-applied backsplashes and edges, unless otherwise indicated. Comply with simulated stone manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer's written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

### **3.4 CONSTRUCTION TOLERANCES**

- A. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/16 in per 48 in (1.5 mm per 1200 mm).
- B. Variation from Level: Do not exceed 1/8 in per 96 in (3 mm per 2400 mm), 1/4 in (6 mm) maximum.
- C. Variation in Joint Width: Do not vary joint thickness more than 1/4 of nominal joint width.
- D. Variation in Plane at Joints (Lipping): Do not exceed 1/64 in (0.4 mm) difference between planes of adjacent units.
- E. Variation in Line of Edge at Joints (Lipping): Do not exceed 1/64 in (0.4 mm) difference between edges of adjacent units, where edge line continues across joint.

### **3.5 INSTALLATION OF SIMULATED STONE COUNTERTOPS**

- A. Install countertops over plywood sub-tops secured to sub-framing supports with full spread of silicone adhesive in accordance with manufacturer's recommendations.
- B. Set countertops to comply with requirements indicated on Drawings and Shop Drawings. Shim and adjust to locations indicated, with uniform joints of widths indicated and with edges and faces aligned according to established relationships and indicated tolerances.
- C. Align adjacent countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop.

- D. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- E. Secure backsplashes to tops and walls with adhesive.
- F. Caulk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants".
- G. Prepare ends and edges of simulated stone pieces to be joined according to the manufacturer's/fabricator's recommendations for position and angle of butted joint. Lightly sand and thoroughly clean to remove dirt and grease. Join pieces with adhesive clamped until fully cured. Buff and sand to produce a smooth uniform seamless surface.
- H. Apply sealant and compress to form bond with simulated stone material and adjacent surfaces and tool sealant surface to clean, straight lines.

### **3.6 CLEANING**

- A. Promptly clean simulated stone as work progresses to minimize final cleaning. Do not leave adhesive or sealant to dry on simulated stone faces.
- B. Final clean and protect installed countertops in accordance with manufacturer's instructions.

### **3.7 FINISH SCHEDULE**

- A. Color: As shown in Interior Finish Schedule on drawings.

## **END OF SECTION**

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**SIMULATED STONE COUNTERTOPS**

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**SECTION 12 4843**  
**ENTRANCE FLOOR MATS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Work required for this section includes roll-up (removable) rail mats entryway flooring systems for recessed applications along with supplementary items necessary to complete their installation.
- B. Related Section:
  - 1. Division 12 Section "Entrance Floor Grilles" for rigid sections of closely spaced rail treads set in recessed frames in the floor; designed to remove debris carried in by foot and wheeled-cart traffic
  - 2. Division 09 Section "Carpeting" for carpet tiles used as walk-off mats.

**1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, sections, details of components, joint locations, details of patterns or designs and attachments to other work. Distinguish between shop and field-assembled work.
  - 1. Coordinate Shop Drawings showing oversized recess if deferred installation of frames with concrete work is necessary.
- C. Samples for Verification: 12 inch (300 mm) square assembled sections of floor mats, frame members, and tread rails with selected tread surface showing each type of metal finish and color of exposed floor mats, tread rails, frames, and accessories required.

**1.3 INFORMATIONAL SUBMITTALS**

- A. Qualification Data:
  - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include list of completed projects.

**1.4 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For cleaning and maintaining floor mats to include in maintenance manuals.

## **1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with not less than 5 years of experience in the successful production and in-service performance of products and systems similar to scope of this Project.

## **1.6 PRE-INSTALLATION CONFERENCE**

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.
  - 1. Participants:
    - a. Architect.
    - b. Contractor, including superintendent.
    - c. Installer, including project manager and supervisor.
    - d. If requested, Manufacturer's qualified technical representative.
    - e. Installers of other construction interfaced with Work.
  - 2. Minimum Agenda: Installer shall demonstrate understanding of the Work required by describing detailed procedures for preparing, installing, and cleaning the Work. Demonstration shall include, but not be limited to, following topics:
    - a. Tour representative areas of Work, inspect and discuss condition of substrate, and other preparatory work performed by other trades.
    - b. Review Contract Document requirements.
    - c. Review approved submittals.
    - d. Review inspection and testing requirements.
    - e. Review environmental conditions and procedures for coping with unfavorable conditions.
    - f. Resolve deviations or differences between Contract Documents and the manufacturer's specifications.
  - 3. Record discussions, including decisions and agreements, and prepare report.

## **1.7 PROJECT CONDITIONS**

- A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

## **1.8 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.
- B. Defer frame installations until building enclosure is completed and related interior finish work is in progress.
- C. Coordinate size and location of oversized recesses in concrete work to receive floor mats and frames.
- D. Concrete, reinforcement, and formwork requirements are specified in Division 03 Section "Cast-in-Place Concrete."

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
- B. Available Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those listed.
- C. Basis of Design (Product Standard): Contract Documents are based on products and systems specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with requirements of Contract Documents as judged by the Architect.
  - 1. American Floor Products Company, Inc.
  - 2. ARDEN Architectural Specialties, Inc.
  - 3. Balco, Inc.
  - 4. Construction Specialties, Inc. (C/S Group)
  - 5. J.L. Industries, Inc.
  - 6. Kadee Industries, Inc.
  - 7. Pawling Corporation; Architectural Products Division
  - 8. Reese Enterprises, Inc.

### **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

### **2.3 ENTRANCE FLOOR MATS, GENERAL**

- A. Structural Performance: Provide roll-up rail mats and frames capable of withstanding the following loads and stresses within limits and under conditions indicated:
  - 1. Uniform floor load of 300 lbf/sq. ft. (14.36 kN/sq. m).
  - 2. Wheel load of 350 lb (159 kg) per wheel.
- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities.

### **2.4 ROLL-UP HINGED MATS**

- A. General: Provide colors, patterns, and profiles of materials, including metals and metal finishes indicated or specified. If not indicated, provide colors, patterns, and profiles selected by Architect from manufacturer's standards.
- B. Roll-up, Vinyl-Rail Hinged Mats: Vinyl-acrylic tread rails 1-1/2 inches (38 mm) wide by 3/8 inch (9.5 mm) thick, with slotted or perforated hinges.

1. Tread Inserts:
  - a. Textured-surface, resilient vinyl.
  - b. 1/4-inch- (6.4-mm-) high, 28-oz./sq. yd. (950-g/sq. m) weight, level-cut, nylon-pile, fusion-bonded carpet. As selected by Architect from full range of industry colors.
2. Rail Color: As selected by Architect from full range of industry colors.
3. Hinges: Aluminum.
4. Mat Size: As indicated.
5. Product Standard: C/S Group; Pedimat series.

- C. Roll-up, Aluminum-Rail Hinged Mats: Extruded-aluminum tread rails 1-1/2 inches (38 mm) wide by 3/8 inch (9.5 mm) thick, sitting on continuous vinyl cushions.

1. Tread Inserts:
  - a. Plain serrated aluminum treads.
  - b. Textured-surface, resilient vinyl.
  - c. 1/4-inch- (6.4-mm-) high, 28-oz./sq. yd. (950-g/sq. m) weight, level-cut, nylon-pile, fusion-bonded carpet. As selected by Architect from full range of industry colors.
2. Rail Color: As selected by Architect from full range of industry colors and color densities.
3. Hinges: Aluminum.
4. Mat Size: As indicated.
5. Product Standard: C/S Group; PediTred series.

## **2.5 CARPET TYPE MATS**

- A. Carpet-Type Walk-Off Mats: Refer to Division 09 Section "Carpeting" for carpet tiles used as walk-off mats.

## **2.6 FRAMES**

- A. Recessed Frames: Manufacturer's standard extrusion.
1. Extruded Aluminum: ASTM B 221 (ASTM B 221M), Alloy 6061-T6 or Alloy 6063-T5, T6, or T52.
    - a. Color: Mill finish.

## **2.7 CONCRETE FILL AND GROUT MATERIALS**

- A. Provide concrete fill and grout equivalent in strength to cast-in-place concrete slabs for recessed mats and frames. Use aggregate no larger than one-third fill thickness.

## **2.8 FABRICATION**

- A. Floor Mats: Shop-fabricate units to greatest extent possible in sizes indicated. Unless otherwise indicated, provide single unit for each mat installation; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in mats are necessary, space symmetrically and away from normal traffic lanes. Miter corner joints in framing elements with hairline joints or provide prefabricated corner units without joints.

- B. Recessed Frames: As indicated, for permanent recessed installation, complete with corner pins or reinforcement and anchorage devices.
  - 1. Fabricate edge-frame members in single lengths or, where frame dimensions exceed maximum available lengths, provide minimum number of pieces possible, with hairline joints equally spaced and pieces spliced together by straight connecting pins.
- C. Coat concealed surfaces of aluminum frames that contact cementitious material with manufacturer's standard protective coating.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION, GENERAL**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer/fabricator's written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.

### **3.3 PREPARATION**

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

### **3.4 INSTALLATION, ENTRANCE FLOOR MATS**

- A. Install recessed mat frames to comply with manufacturer's written instructions. Set mat tops at height recommended by manufacturer for most effective cleaning action; coordinate tops of mat surfaces with bottoms of doors that swing across mats to provide clearance between door and mat.
  - 1. Install necessary shims, spacers, and anchorages for proper location, and secure attachment of frames.
  - 2. Install grout and fill around frames and, if required to set mat tops at proper elevations, in recesses under mats. Finish grout and fill smooth and level.

### **3.5 PROTECTION**

- A. After completing frame installation and concrete work, provide temporary filler of plywood or fiberboard in recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Substantial Completion.

**END OF SECTION**

## **SECTION 12 9313**

### **BICYCLE RACKS**

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. Section includes bicycle racks and supplementary items necessary to complete work required for their installation.

##### **1.2 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
  - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Shop Drawings: Show details of fabrication and installation, including plans, elevations, sections, details of components and attachments to other work. Distinguish between shop and field-assembled work
- C. Samples: Submit one 12" long tube section for each finish specified.

##### **1.3 COORDINATION**

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

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

##### **2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitution Procedures".
- B. Available Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, manufacturers offering products that may be incorporated into the Work include, but are not limited to, those listed.
  - 1. AAA Ribbon Rack Co. - "The Original Ribbon Rack"
  - 2. Bike Security Racks Co. - "Bike Stanchions"
  - 3. Columbia Cascade Co. - "Original CycLoops"
  - 4. Gametime, Inc. - "7700 Series Loop Bike Rack"
  - 5. Madrax, Inc. - "Heavy-Duty Winder"
  - 6. Madrax, Inc. - "Winder-Plus"

## **2.2 MATERIALS, GENERAL**

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

## **2.3 MATERIAL**

- A. Pipe:
  - 1. Schedule 40 steel pipe. [Schedule 40 stainless steel pipe.] [Schedule 10 steel pipe.]
  - 2. Gage/Thickness: 0.154 inch [0.109 inch]
  - 3. Diameter: 2.375 inch (60 mm) OD [1.625 inch (41 mm) OD]

## **2.4 FABRICATION**

- A. Stand: Minimum 35 [42] inch high serpentine type stand.
- B. Finish: Hot-dipped galvanized. [Electrostatically applied powder-coat finish. Color as selected by Architect from manufacturer's standard colors.] [No. 4 satin stainless steel.]
- C. Anchor Type: In-Ground. [Surface Flange Mount.]

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

### **3.2 INSTALLATION**

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
  - 1. Respective manufacturer written installation instructions.
  - 2. Accepted submittals.
  - 3. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

**END OF SECTION**