

Project Manual

Construction Documents

Heritage Middle School Renovation

600 West Kansas Street
Liberty, Missouri 64068

Prepared For:

Liberty Public School District

8 Victory Lane

Liberty, Missouri 64068

HM Project No: 23024

Issue Date: December 07, 2023

Contents:

Volume 1: Introductory Information, Bidding and Contracting Requirements,
Division 1 through Division 14.

Volume 2: Division 22 through Division 28.



we design the future®

HOLLISANDMILLER.COM

1828 Walnut Street Suite 922 | Kansas City, MO 64108 | 816.442.7700
Missouri | Colorado



SECTION 000101 - PROJECT TEAM DIRECTORY

PART 1 - GENERAL

1.1 CONSTRUCTION MANAGER INFORMATION

- A. Newkirk Novak Construction Partners has been selected as the Construction Manager for this project, and as such, will act as the Owner's representative.
- B. All communication, both written and oral, must be directed through the Construction Manager.

1.2 PROJECT TEAM INFORMATION

- A. **PROJECT:**
 - 1. Name: 23024 Heritage Middle School Renovations
 - 2. Location: 600 W Kansas Street, Liberty , Missouri 64068
 - 3. Project No: 23024
- B. **OWNER:**
 - 1. Name: Liberty Public Schools
 - 2. Address: 8 Victory Lane, Liberty, Missouri 64068
 - 3. Contact: Steve Anderson
 - 4. Phone: 816.736.5448
 - 5. Email: steven.anderson@lps53.org
- C. **CONSTRUCTION MANAGER:**
 - 1. Name: Newkirk Novak Construction Partners
 - 2. Address: 11200 W. 79th Street, Lenexa, Kansas 66214
 - 3. Contact: Jim Schneider
 - 4. Email: Jim.Schneider@newkirknovak.com
 - 5. Phone: 913.312.9535.
- D. **ARCHITECT:**
 - 1. Name: Hollis + Miller Architects, Inc.
 - 2. Address: 1828 Walnut Street, Suite 922, Kansas City, MO 64108.
 - 3. Contact: Meaghan Williams
 - 4. Email: mwilliams@hollisandmiller.com
 - 5. Phone: 816.442.7700 / Fax: 816.599.2545
- E. **STRUCTURAL ENGINEER:**
 - 1. Name: Bob D. Campbell & Co.
 - 2. Address: 4338 Belleview Ave, Kansas City, Missouri 64111.
 - 3. Contact: Wayne Davis
 - 4. Email: wdavis@bdc-engrs.com
 - 5. Phone: 816.531.4114 / Fax: 816.531.8572
- F. **MEP ENGINEER:**
 - 1. Name: Smith and Boucher
 - 2. Address: 25618 W 103rd Street, Olathe, Kansas 66061.
 - 3. Contact: Ryan Diediker - Engineer.
 - 4. Email: rdiediker@smithboucher.com.
 - 5. Phone: 913.345.2127.
- G. **FOOD SERVICE CONSULTANT:**
 - 1. Name: MHA Food Facility Consultants
 - 2. Address: 7840 Conser Street, Overland Park, Kansas 66204
 - 3. Contact: Mike Terlouw.
 - 4. Email: mike@mhaconsulting.com.
 - 5. Phone: 785.266.5696.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 000101

SECTION 000105 - CERTIFICATIONS PAGE

ARCHITECT

I HEREBY, PURSUANT TO RSMO 327.411, STATE THAT THE SPECIFICATIONS INTENDED TO BE AUTHENTICATED BY MY SEAL ARE LIMITED TO SPECIFICATIONS LISTED BELOW:

DIVISION 1 SECTIONS:	011000, 012100, 012200, 012300, 012500, 013100, 013200, 013233, 013300, 014000, 014200, 014529, 016000, 017310, 017419, 017700, 017823, 017839, 017900.
DIVISION 2 SECTION:	024119.
DIVISION 4 SECTIONS:	040100, 040140, 042000, 047200.
DIVISION 5 SECTIONS:	055000, 055213.
DIVISION 6 SECTIONS:	061000, 061600, 062023, 064023, 066400.
DIVISION 7 SECTIONS:	072100, 072500, 072726, 074646, 075113, 076200, 078413, 078446, 079200, 079500.
DIVISION 8 SECTIONS:	081113, 081416, 081433, 083113, 083326, 084113, 084123, 085123, 087100, 088000.
DIVISION 9 SECTIONS:	092116, 092117, 092900, 093000, 095113, 096513, 096519, 096723, 096813, 097700, 097723, 098433, 098436, 099113, 099123, 099300, 099600.
DIVISION 10 SECTIONS:	101100, 101423, 102113, 102238, 102600, 102800, 104413, 104416, 105113
DIVISION 12 SECTIONS:	122113, 122413, 123200, 123666.
DIVISION 14 SECION:	144200.

I HEREBY DISCLAIM ANY RESPONSIBILITY FOR ALL OTHER SPECIFICATIONS, DRAWINGS, ESTIMATES, REPORTS, OR OTHER DOCUMENTS OR INSTRUMENTS RELATING TO OR INTENDED TO BE USED FOR ANY PART OR PARTS OF THE ARCHITECTURAL OR ENGINEERING PROJECT OR SURVEY.

KEVIN NELSON _____

DECEMBER 07, 2023 _____

ARCHITECT

DATE



DECEMBER 7, 2023

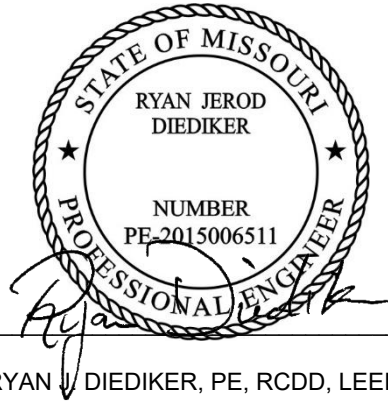
SECTION 000105 - CERTIFICATIONS PAGE-MEP

MEP ENGINEER

I HEREBY, PURSUANT TO RSMO 327.411, STATE THAT THE SPECIFICATIONS INTENDED TO BE AUTHENTICATED BY MY SEAL ARE LIMITED TO SPECIFICATIONS LISTED BELOW:

DIVISION 22 SECTIONS:	220500, 220523, 220529, 220553, 220719, 221116, 221119, 221316, 221319, 224000
DIVISION 23 SECTIONS:	230500, 230513, 230516, 230517, 230518, 230519, 230523, 230529, 230553, 230593, 230713, 230719, 230900, 232113, 232116, 232300, 233113, 233300, 233600, 233713, 237343.16, 238126, 238219
DIVISION 26 SECTIONS:	260500, 260519, 260523, 260526, 260529, 260533, 260553, 260923, 260943, 262416, 262726, 262813, 262816, 265119, 265213
DIVISION 27 SECTIONS:	270000, 270500, 270526
DIVISION 28 SECTIONS:	280500, 285013, 283111

I HEREBY DISCLAIM ANY RESPONSIBILITY FOR ALL OTHER SPECIFICATIONS, DRAWINGS, ESTIMATES, REPORTS, OR OTHER DOCUMENTS OR INSTRUMENTS RELATING TO OR INTENDED TO BE USED FOR ANY PART OR PARTS OF THE ARCHITECTURAL OR ENGINEERING PROJECT OR SURVEY.



RYAN J DIEDIKER, PE, RCDD, LEED AP

12.07.2023

DATE

SECTION 000105 - CERTIFICATIONS PAGE

STRUCTURAL ENGINEER

I HEREBY, PURSUANT TO RSMO 327.411, STATE THAT THE SPECIFICATIONS INTENDED TO BE AUTHENTICATED BY MY SEAL ARE LIMITED TO SPECIFICATIONS LISTED BELOW:

DIVISION 3 SECTIONS: 033000

DIVISION 4 SECTIONS: 042200

DIVISION 5 SECTIONS: 051200, 054000

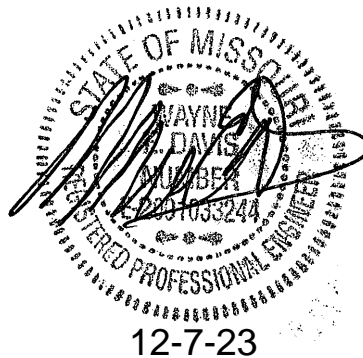
I HEREBY DISCLAIM ANY RESPONSIBILITY FOR ALL OTHER SPECIFICATIONS, DRAWINGS, ESTIMATES, REPORTS, OR OTHER DOCUMENTS OR INSTRUMENTS RELATING TO OR INTENDED TO BE USED FOR ANY PART OR PARTS OF THE ARCHITECTURAL OR ENGINEERING PROJECT OR SURVEY.

WAYNE E. DAVIS

12/7/2023

STRUCTURAL ENGINEER

DATE



DOCUMENT 000110 – TABLE OF CONTENTS

Project Name: Heritage Middle School Renovation
 Project No.: 23024
 Site Address: 600 West Kansas Street
 City, State Zip: Liberty, Missouri 64068

Revisions	Date

Latest Revision Original Issue

INTRODUCTORY INFORMATION

000101	Project Team Directory	12.07.2023
000105	Certifications and Seals	12.07.2023
000110	Table of Contents	12.07.2023

BIDDING REQUIREMENTS

(Refer to Construction Manager's Front End Manual for additional Bidding Requirements)

CONTRACTING REQUIREMENTS

(Refer to Construction Manager's Front End Manual for additional Contracting Requirements)

DIVISION 1 – GENERAL REQUIREMENTS

011000	Summary	12.07.2023
012100	Allowances	12.07.2023
012200	Unit Prices	12.07.2023
012300	Alternates	12.07.2023
012500	Substitution Procedures	12.07.2023
012500.1	Substitution Procedures Form	12.07.2023
013100	Project Management and Coordination	12.07.2023
013200	Construction Progress Documentation	12.07.2023
013233	Photographic Documentation	12.07.2023
013300	Submittal Procedures	12.07.2023
014000	Quality Requirements	12.07.2023
014200	References	12.07.2023
014529	Testing and Inspections	12.07.2023
016000	Product Requirements	12.07.2023
017310	Cutting and Patching	12.07.2023
017419	Construction Waste Management & Disposal	12.07.2023
017700	Closeout Procedures	12.07.2023
017823	Operation and Maintenance Data	12.07.2023
017839	Project Record Documents	12.07.2023
017900	Demonstration and Training	12.07.2023

DIVISION 2 – EXISTING CONDITIONS

024119	Selective Demolition	12.07.2023
--------	----------------------	------------

DIVISION 3 – CONCRETE

033000	Cast-in-Place Concrete	12.07.2023
--------	------------------------	------------

DIVISION 4 - MASONRY

040100	Masonry Restoration and Cleaning	12.07.2023
040140	Stone Repair	12.07.2023
042000	Unit Masonry	12.07.2023
042200	Concrete Unit Masonry	12.07.2023
047200	Cast Stone Masonry	12.07.2023

DIVISION 5 - METALS

051200	Structural Metal Framing	12.07.2023
054000	Cold-Formed Metal Framing	12.07.2023
055000	Metal Fabrications	12.07.2023
055213	Pipe and Tube Railings	12.07.2023

DIVISION 6 – WOOD AND PLASTICS

061000	Rough Carpentry	12.07.2023
061600	Sheathing	11.21.2023
062023	Interior Finish Carpentry	12.07.2023
064023	Interior Architectural Woodwork	12.07.2023
066400	Plastic Paneling	12.07.2023

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

072100	Thermal Insulation	12.07.2023
072500	Weather Barriers	12.07.2023
072726	Fluid-Applied Membrane Air Barrier	12.07.2023
074646	Fiber Cement Siding	12.07.2023
075113	Cold/Hot Applied Built-Up Bituminous Roofing	12.07.2023
076200	Sheet Metal Flashing and Trim	12.07.2023
078413	Penetration Firestopping	12.07.2023
078446	Fire Resistive Joint Systems	12.07.2023
079200	Joint Sealants	12.07.2023
079500	Expansion Control	12.07.2023

DIVISION 8 - DOORS AND WINDOWS

081113	Hollow Metal Doors and Frames	12.07.2023
081416	Flush Wood Doors	12.07.2023
081433	Stile and Rail Wood Doors	12.07.2023
083113	Access Doors and Frames	12.07.2023
083326	Overhead Coiling Grilles	12.07.2023
084113	Aluminum Framed Entrances and Storefronts	12.07.2023
084123	Steel Framed Entrances and Storefronts	12.07.2023
085123	Steel Windows	12.07.2023
087100	Door Hardware	12.07.2023
088000	Glazing	12.07.2023

DIVISION 9 - FINISHES

092116	Non-Structural Metal Framing	12.07.2023
092117	Gypsum Board Shaft-Wall Assemblies	12.07.2023
092900	Gypsum Board	12.07.2023
093000	Tiling	12.07.2023
095113	Acoustical Panel Ceilings	12.07.2023
096513	Resilient Base and Accessories	12.07.2023
096519	Resilient Tile Flooring	12.07.2023
096723	Resinous Flooring	12.07.2023
096813	Tile Carpeting	12.07.2023
097700	Special Wall Finish System	12.07.2023
097723	Fabric-Wrapped Panels	12.07.2023
098433	Acoustical Wall Units	12.07.2023
098436	Acoustical Ceiling Units	12.07.2023
099113	Exterior Painting	12.07.2023

	Latest Revision	Original Issue
099123	Interior Painting	12.07.2023
099300	Staining and Transparent Finishing	12.07.2023
099600	High-Performance Coatings	12.07.2023
DIVISION 10 – SPECIALTIES		
101100	Visual Display Units	12.07.2023
101423	ADA and Code Signage	12.07.2023
102113	Toilet Compartments	12.07.2023
102238	Operable Panel Partitions	12.07.2023
102600	Wall and Door Protection	12.07.2023
102800	Toilet, Bath & Laundry Accessories	12.07.2023
104413	Fire Extinguisher Cabinets	12.07.2023
104416	Fire Extinguishers	12.07.2023
105113	Metal Lockers	12.07.2023
DIVISION 11 - EQUIPMENT		
114000	Food Service Equipment	12.07.2023
DIVISION 12 - FURNISHINGS		
122113	Horizontal Louver Blinds	12.07.2023
122413	Roller Window Shades	12.07.2023
123200	Manufactured Wood Casework	12.07.2023
123666	Solid Surfacing Countertops	12.07.2023
DIVISION 14 - CONVEYING SYSTEMS		
144200	Wheelchair Lifts	12.07.2023
DIVISION 22 - PLUMBING		
220500	Common Work Results for Plumbing	12.07.2023
220523	General-Duty Valves for Plumbing Piping	12.07.2023
220529	Hangers and Supports for Plumbing Piping and Equipment	12.07.2023
220553	Identification for Plumbing Piping and Equipment	12.07.2023
220719	Plumbing Piping Insulation	12.07.2023
221116	Domestic Water Piping	12.07.2023
221119	Domestic Water Piping Specialties	12.07.2023
221316	Sanitary Waste and Vent Piping	12.07.2023
221319	Sanitary Waste Piping Specialties	12.07.2023
224000	Plumbing Fixtures	12.07.2023
DIVISION 23 - HEATING, VENTILATING AND AIR CONDITIONING		
230500	Common Work Results for HVAC	12.07.2023
230513	Motors for HVAC Equipment	12.07.2023
230516	Expansion Fittings and Loops for HVAC Piping	12.07.2023
230517	Sleeves and Sleeve Seals for HVAC Piping	12.07.2023
230518	Escutcheons for HVAC Piping	12.07.2023
230519	Meters and Gages for HVAC Piping	12.07.2023
230523	General Duty Valves for HVAC Piping	12.07.2023
230529	Hangers and Supports for HVAC Piping and Equipment	12.07.2023
230553	HVAC System Identification	12.07.2023
230593	Testing, Adjusting, and Balancing for HVAC	12.07.2023
230713	Duct Insulation	12.07.2023
230719	HVAC Piping Insulation	12.07.2023
230900	Instrumentation and Control for HVAC	12.07.2023

	Latest Revision	Original Issue
232113	Hydronic Piping	12.07.2023
232116	Hydronic Piping Specialties	12.07.2023
232300	Refrigerant Piping	12.07.2023
233113	Metal Ducts	12.07.2023
233300	Duct Accessories	12.07.2023
233600	Air Terminal Units	12.07.2023
233713	Diffusers, Registers, and Grilles	12.07.2023
237343.16	Outdoor, Semi-Custom Air-Handling Units	12.07.2023
238126	Split-System Air-Conditioners	12.07.2023
238219	Fan Coil Units	12.07.2023
DIVISION 26 - ELECTRICAL		
260500	Common Work Results for Electrical	12.07.2023
260519	Low-Voltage Electrical Power Conductors and Cables	12.07.2023
260523	Control-Voltage Electrical Power Cables	12.07.2023
260526	Grounding and Bonding for Electrical Systems	12.07.2023
260529	Hangers and Supports for Electrical Systems	12.07.2023
260533	Raceway and Boxes for Electrical Systems	12.07.2023
260553	Identification for Electrical Systems	12.07.2023
260923	Lighting Control Devices	12.07.2023
260943	Distributed Digital Control System	12.07.2023
262416	Panelboards	12.07.2023
262726	Wiring Devices	12.07.2023
262813	Fuses	12.07.2023
262816	Enclosed Switches and Circuit Breakers	12.07.2023
265119	LED Interior Lighting	12.07.2023
265213	Emergency and Exit Lighting	12.07.2023
DIVISION 27 – COMMUNICATIONS		
270000	District Communications Specifications	12.07.2023
270500	Common Work Results for Communications	12.07.2023
270526	Grounding and Bonding for Communications Systems	12.07.2023
DIVISION 28 - ELECTRONIC ACCESS CONTROL AND INTRUSION DETECTION		
280500	Common Work Results for Electronic Safety and Security	12.07.2023
280513	Conductors and Cables for Electronic Safety and Security	12.07.2023
283111	Digital, Addressable Fire-Alarm System	12.07.2023

END OF TABLE OF CONTENTS

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Project information.
 - 2. Work covered by Contract Documents.
 - 3. Work by Owner.
 - 4. Work under separate contracts.
 - 5. Future work.
 - 6. Access to site.
 - 7. Coordination with occupants.
 - 8. Work restrictions.
 - 9. Specification and drawing conventions.
 - 10. Miscellaneous provisions.
- B. Related Requirements:
 - 1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.2 PROJECT INFORMATION

- A. Project Identification: 23024 Heritage Middle School Renovations
 - 1. Project Address: 600 W Kansas Street, Liberty, Missouri 64068 .
- B. Owner: **Liberty Public Schools**
 - 1. Refer to Document 000101 "Project Team Directory."
- C. Architect:
 - 1. Refer to Document 000101 "Project Team Directory."
 - 2. Architect's Address: Hollis + Miller Architects, Inc., 1828 Walnut Street, Suite 922, Kansas City, MO 64108.
 - 3. Architect's Representative: Architect Contact .
- D. Architect's Consultants: The Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:
 - 1. Refer to Document 000101 "Project Team Directory."
- E. Construction Manager:
 - 1. Refer to Document 000101 "Project Team Directory."
 - 2. Construction Manager has been engaged for this Project to serve as an advisor to Owner and to provide assistance in administering the Contract for Construction between Owner and each Contractor, according to a separate contract between Owner and Construction Manager.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:
 - 1. General: All demolition, sitework, architectural, structural, fire suppression, plumbing, mechanical, electrical, access control, technology and utilities as indicated in the Contract Documents and as further defined in the Scopes of Work.
 - 2. Alternates: Refer to Section 012300 "Alternates".
- B. Type of Contract:
 - 1. Project will be constructed under a multiple trade contract.

1.4 WORK BY OWNER

- A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.
- B. Preceding Work: Owner will remove certain items from the Project site. Those operations are scheduled to be substantially complete before work under this Contract begins.
- C. Concurrent Work: Owner will perform the following construction operations at Project site. Those operations will be conducted simultaneously with work under this Contract.
 - 1. Cabling for Technology: Owner will furnish and install technology cabling as work progresses.

1.5 WORK UNDER SEPARATE CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.
- B. Subsequent Work: Owner will award separate contract(s) for the following additional work to be performed at site following Substantial Completion. Completion of that work will depend on successful completion of preparatory work under this Contract.
 - 1. Building Technology Package.

1.6 FUTURE WORK

- A. The Contract Documents include requirements that will allow the Owner to carry out future work following completion of this portion of the Project. Future work will include a forthcoming packages:
 - 1. Building Technology Package.
 - a. **[VERIFY]**

1.7 ACCESS TO SITE

- A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Limits: Confine construction operations to areas indicated and as directed by Construction Manager.
 - 2. Driveways, Walkways, and Entrances: Keep driveways, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Restrictions: Note that no deliveries to the Project Site will be allowed between the hours of 7:00 am to 8:30 am and 2:00 pm to 3:30 pm.
 - b. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - c. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.8 COORDINATION WITH OCCUPANTS

- A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

1.9 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7:00 a.m. to 4:00 p.m., Monday through Friday, unless otherwise indicated.
 1. Weekend Hours: Coordinate and schedule all weekend hours with the Owner not less than 48 hours in advance. Comply with regulations of authorities having jurisdiction.
 2. Early Morning Hours: Notify Owner of days when early morning hours will be required and comply with regulations of authorities having jurisdiction.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 1. Notify Architect and Owner not less than three (3) days in advance of proposed utility interruptions.
 2. Obtain Owner's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
 1. Notify Architect and Owner not less than three (3) days in advance of proposed disruptive operations.
 2. Obtain Owner's written permission before proceeding with disruptive operations.
- E. Nonsmoking Buildings and Sites: Smoking is not permitted on School District property.
- F. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.
- G. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.
- H. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.
 1. Maintain list of approved screened personnel with Owner's representative.
 2. As a condition for the award of any service contract in excess of \$5,000.00 by the Owner, the service provider must be enrolled in and currently participating in "E-Verify" or any other equivalent electronic verification of work authorization program operated by the U.S. Department of Homeland Security.
 3. As a further condition for the award of any service contract in excess of \$5,000.00 the service provider shall not knowingly employ any person who is an un-authorized alien in conjunction with the contracted services.
 - a. E-Verify forms are available for duplication and contractor's use in Section 008400 – Attachments.

1.10 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 011000

SECTION 012100 - ALLOWANCES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
 - 1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.
- B. Types of allowances include the following:
 - 1. Lump-sum allowances.
 - 2. Unit-cost allowances.
- C. Related Requirements:
 - 1. Section 012200 "Unit Prices" for procedures for using unit prices.
 - 2. Section 014000 "Quality Requirements" for procedures governing the use of allowances for testing and inspecting.

1.2 SELECTION AND PURCHASE

- A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
- B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by Architect from the designated supplier.

1.3 ACTION SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

1.4 INFORMATIONAL SUBMITTALS

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.5 COORDINATION

- A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.6 LUMP-SUM AND UNIT-COST ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include taxes, freight, and delivery to Project site.

1. Sales and Use Taxes shall be omitted for this project.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner and/or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.
- C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
 1. If requested by Architect, retain, and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.
- D. Refer to "Bid Packages" for further clarification of required allowances.

1.7 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 1. Include installation costs in purchase amount only where indicated as part of the allowance.
 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
 3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
 4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

- A. General: Refer to individual Bid Package – Scopes of Work for Allowances.

END OF SECTION 012100

SECTION 012200 - UNIT PRICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for unit prices.
- B. Related Requirements:
 - 1. Section 012600 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
 - 2. Section 014000 "Quality Requirements" for general testing and inspecting requirements.

1.2 DEFINITIONS

- A. Unit price is an amount incorporated in the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.3 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes (other than sales and use tax), overhead, and profit.
- B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 SCHEDULE OF UNIT PRICES

- A. Refer to Individual Bid Package – Scopes of Work.

END OF SECTION 012200

This page intentionally left blank

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
 - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Alternate No. 1: LED Lighting Replacement
 - 1. Alternate: Alternate includes all labor, materials, equipment, and appurtenances for LED Lighting replacement as indicated by Type RA Fixtures, as indicated on MEP Drawings as Alternate No. 1.
 - 2. Base Bid: Do not provide LED Lighting Replacement as indicated on MEP Drawings as Alternate No. 1.
- B. Alternate No. 2: Level 0 & 1 1920's Flex Renovation
 - 1. Alternate: Alternate includes all labor, materials, equipment, and appurtenances for Demolition and New Work associated with renovating Existing Level 0 Locker Bay and Level 1 PLC Area into New Flex Space/Heritage Hall of Fame as indicated on Drawings as Alternate No. 2.
 - 2. Base Bid: Do not provide renovations to Existing Level 0 Locker Bay and Level 1 PLC Area as indicated on Drawings as Alternate No. 2.
- C. Alternate No.3: Level 1 & 2 Locker Bay Renovation
 - 1. Alternate: Alternate includes all labor, materials, equipment, and appurtenances for Demolition and New Work associated with renovating Existing Level 1 and Level 2 Locker Bays into New Flex Space/Theater Storage as indicated on Drawings as Alternate No. 3.

2. Base Bid: Do not provide renovations to Existing Level 1 and Level 2 Locker Bays as indicated on Drawings as Alternate No. 3.
- D. Alternate No. 4: Commons Storefront Replacement
1. Alternate: Alternate includes all labor, materials, equipment, and appurtenances for Demolition and New Work associated with East Commons Storefront Replacement as indicated on Drawings as Alternate No. 4.
 2. Base Bid: Do not replace East Commons Storefront as indicated on Drawings as Alternate No 4.
- E. Alternate No. 5: Restroom Renovations
1. Alternate: Alternate includes all labor, materials, equipment, and appurtenances for Demolition and New Work associated with Renovating Existing Restrooms on Level 0 and Level 2 as indicated on Drawings as Alternate No. 5.
 2. Base Bid: Do not Renovate Existing Restrooms as indicated on Drawings as Alternate No 5.
- F. Alternate No. 6: Nutrition Services Renovation
1. Alternate: Alternate includes all labor, materials, equipment, and appurtenances for Demolition and New Work associated Scramble, Cafeteria, & Existing Stage areas (Level 0, Area C) as indicated on Drawings as Alternate No. 6.
 2. Base Bid: Do not provide renovations to Scramble, Cafeteria, & Existing Stage areas as indicated on Drawings as Alternate No 6.
- G. Alternate No. 7: Kitchen Flooring
1. Alternate: Alternate includes all labor, materials, equipment, and appurtenances for Demolition and New Work associated with new resinous floor in Kitchen C008 (Level 0, Area C).as indicated on Drawings as Alternate No. 7.
 2. Base Bid: Do not replace provide new resinous floor as indicated on Drawings as Alternate No 7.

END OF SECTION 012300

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for "Substitutions for Convenience" and "Substitutions for Cause".
- B. Related Requirements:
 - 1. Section 012100 "Allowances" for products selected under an allowance.
 - 2. Section 012200 "Unit Prices" for products selected under a unit price.
 - 3. Section 012300 "Alternates" for products selected under an alternate.
 - 4. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.
 - 5. Division 02 through 33 Sections for specific requirements and limitations for substitutions.

1.2 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms. Substitutions for Cause shall be submitted after award of the contract as set forth hereinafter.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner. Substitutions for Convenience shall be submitted prior to bidding as set forth hereinafter.
- B. Comparable Products: Naming of specified items on the Drawings and in the specifications, means that such named items are specifically required by the Architect and/or Owner. When the words "or comparable product" follows such named item(s), a substitution request must be submitted when proposing a product other than the named product. Requests for substitutions must be received by the Architect within the time frame set hereinafter.
- C. The following are not considered substitutions:
 - 1. Revisions to Contract Documents requested by the Owner or Architect.
 - 2. Specified options of products, materials and construction methods included in the Contract Documents.

1.3 ACTION SUBMITTALS

- A. Substitution Requests: Submit at least one (1) paper copy or an electronic pdf copy of each request for consideration to the Architect. Clearly Identify proposed product and related options or fabrication or installation method to be replaced. Include Specification Section number and title, in addition to applicable Drawing numbers and titles.
 - 1. Substitution Request Form: Use facsimile of form provided at the end of this Section.
 - a. Accompanying each Substitution Request shall be a fully executed copy of the Substitution Request Form.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication, or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Specifically indicate deviations, if any, from the Work specified in writing.

- d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested, of proposed substitution and of specified product shall be submitted for comparison and review by Architect.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses and names, addresses and contact information of architects and owners.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Review Process: Submittal requests for proposed substitutions will be processed using the following procedures:
- a. Submittals will be "Received Dated" immediately upon arrival.
 - b. Submittals will be placed by receiving person in a file designated for that purpose.
 - c. Submittals will not be reviewed for completeness or compliance until after the date and time established for closing of receipt of substitution request submittals.
 - d. Submittals will be reviewed by a member of Hollis + Miller Architect's staff (or respective consultant). Reviewer(s) will not be designated until after closing period established for receipt of submittals.
 - e. Reviewer's General Attitude will be:
 - 1) Burden of Proof is on Proposer.
 - 2) Reviewer should not be required to complete the submittal, that is, select from options or between models and lines of products.
 - 3) Reviewer should not be required to conduct an exhaustive review of the submittal. Submittals of manufacturer's catalogs which do not clearly indicate proposed product and proposed product options will be rejected.
 - 4) Reviewer should not be required to seek information from manufacturer's literature on file in the office, from an improperly submitted electronic submittal or information in other locations.
 - 5) Substitute must be "comparable to" or superior in those features and performance which the Project requires and those which the specified product will provide.
 - 6) Review is complete when, in the reviewer's opinion, significant deficiency(ies) are established. In such case, review of data covering other points of specifications is not required.
 - f. Reviewer will note action taken (No Exception taken to Submitted Manufacturer, No Exception taken to Specific Product, Exceptions Noted, Not Accepted or Received Late), the date, and his/her initials.
 - g. All submittals received after closing time will be "Received Dated", marked "Late", initialed by reviewer, and filed without review.
 - h. Submittals will be filed in Architect's office until completion of the Project.
4. Architect's Action:
- a. Architect will review requests for "Substitutions for Convenience" only once, no additional information may be submitted. Architect may request additional information as necessary for review of "Substitutions for Cause."
 - b. Architect will note action taken.
 - c. Architect is not obligated nor required to review any and all substitution requests.
 - d. Architect is not obligated to inform proposers of substitutions of incomplete and non-accepted requests for substitution.
 - e. Acceptance of Substitutions:
 - 1) Acceptance of Substitutions for Convenience: Accepted substitutions will be set forth in an Addendum and in no other manner.
 - (a) Use product specified if Architect does not issue a decision on use of a proposed substitution.
 - 2) Acceptance of Substitutions for Cause: Architect will review proposed substitution within 15 business days of receipt of request. If necessary, Architect, through Construction Manager, will request additional information or documentation for evaluation within seven (7) business days of

receipt of a request for Substitution for Cause.” Architect will notify Contractor through Construction Manager of acceptance of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

Only acceptable substitutions will receive notification of status. Substitutions shall be considered unacceptable unless a form of acceptance is received by the Proposer.

- (a) Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
- (b) Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.4 ELECTRONIC SUBMITTAL OF SUBSTITUTIONS

- A. Substitution Request submittals will be accepted for review when submitted electronically under the following conditions. Substitution requests which are not submitted in accordance with the criteria listed below may be rejected at the Architect's discretion.
 - 1. Accompanying each submittal shall be a fully executed copy of the Substitution Request Form.
 - 2. Submittals shall be sent to Hollis + Miller Architects, to the attention of the contact listed in Document 000101 "Project Team Directory. Submittals directed to the attention of anyone other than the contact listed will not be considered.
 - 3. Submittals of Substitutions for Cause must be received within the time limits set forth in Paragraph 2.1 A of this Section.
 - 4. Submittals of Substitutions for Convenience must be received prior to bidding and within the time limits set forth in Paragraph 2.1 B of this Section.
 - 5. Documentation requirements as set forth in 1.3 A.2a through 1.3 A.2m are applicable to electronic submittals.
 - a. Note: Electronic submittals in which the manufacturer's entire catalog is submitted will be rejected.

1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than thirty (30) days prior to time required for preparation and review of related submittals.
 - 1. Conditions: Architect and Owner will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Request is directly related to a "or comparable product" clause or similar language in the Contract Documents.
 - c. Specified product or method of construction cannot be provided within the Contract Time.
 - d. Specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where the Contractor certifies that the substitution will overcome the incompatibility.
 - e. Specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution will provide the specified warranty.
 - f. Substitution request is fully documented and properly submitted.

- g. Requested substitution will not adversely affect Contractor's construction schedule.
 - h. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - i. Requested substitution is compatible with other portions of the Work.
 - j. Requested substitution has been coordinated with other portions of the Work.
 - k. Requested substitution provides specified warranty.
 - l. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Architect will consider requests for substitution only when submitted prior to bidding, and no later than 4:00 p.m. (local time) eight (8) calendar days prior to the date established for receipt of bids. Requests received after that time may be considered or rejected at discretion of Architect.
- 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - b. Requested substitution does not require extensive revisions to the Contract Documents.
 - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - d. Substitution request is fully documented and properly submitted.
 - e. Requested substitution will not adversely affect Contractor's construction schedule.
 - f. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - g. Requested substitution is compatible with other portions of the Work.
 - h. Requested substitution has been coordinated with other portions of the Work.
 - i. Requested substitution provides specified warranty.
 - j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- C. The Contractor's submittal and A/E's acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with the Contract Documents does not constitute an acceptance or validate request for substitution, nor does it constitute approval.
- D. Under no circumstances does the Architect's and/or Owner's acceptance of any such substitution relieve the Contractor from timely, full and proper performance of the Work.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 012500

SECTION 012500.01 - SUBSTITUTION PROCEDURES FORM

PROJECT: HERITAGE MIDDLE SCHOOL 600 WEST KANSAS STREET, LIBERTY, MO 64068

MAIL TO: HOLLIS + MILLER ARCHITECTS, 1828 WALNUT ST, SUITE 922, KANSAS CITY, MISSOURI, 64108

SPECIFIED ITEM/ KEYNOTE #: _____

PROPOSED SUBSTITUTE: _____

SUBMITTED BY: _____

FIRM: _____

ADDRESS: _____

SIGNATURE: _____ **DATE:** _____

PHONE NUMBER: _____

ATTACH COMPLETE DESCRIPTION, DESIGNATION, CATALOG OR MODEL NUMBER, SPEC DATA SHEET AND OTHER TECHNICAL DATA AND SAMPLES, INCLUDING LABORATORY TESTS IF APPLICABLE.

FILL IN BLANKS BELOW:

1. WILL SUBSTITUTION AFFECT DIMENSION INDICATED ON DRAWINGS?
2. WILL SUBSTITUTION AFFECT WIRING, PIPING, DUCTWORK, ETC., INDICATED ON DRAWINGS?
3. WHAT EFFECT WILL SUBSTITUTION HAVE ON OTHER TRADES?
4. DIFFERENCES BETWEEN PROPOSED SUBSTITUTION AND SPECIFIED ITEM?
5. ANY AND ALL IMPACTS ON COSTS, DESIGN MODIFICATIONS, ADDITIONAL ARCHITECTURAL AND ENGINEERING SERVICES, MATERIAL AND LABOR CHANGES, SCHEDULE CHANGES, AND OTHER UNANTICIPATED CONSEQUENCES, RESULTING FROM THIS SUBSTITUTION IN LIEU OF THE SPECIFIED ITEM, SHALL BE THE FULL

RESPONSIBILITY OF THE CONTRACTOR AND HIS SUBCONTRACTORS AND SUPPLIER.

6. MANUFACTURER'S WARRANTIES OF THE SPECIFIED ITEMS AND PROPOSED ITEMS ARE: ☐ SAME OR
☐ DIFFERENT, *EXPLAIN:* _____

REVIEW COMMENTS:

☐ **NO EXCEPTION TAKEN TO SUBMITTED MANUFACTURER**
MANUFACTURER ONLY IS ACCEPTED DUE TO TIME LIMITATIONS FOR FULL REVIEW OF PRODUCT, OR BECAUSE NO SPECIFIC PRODUCT DATA IS SUBMITTED, OR OTHER UNSPECIFIED REASONS. CONTRACTOR MUST STILL BEAR FULL RESPONSIBILITY FOR COMPLIANCE WITH CONTRACT REQUIREMENTS.

☐ **NO EXCEPTION TAKEN TO SPECIFIC PRODUCTS**

☐ **EXCEPTIONS NOTED**
SEE ATTACHED COPY OR NOTES ON PRODUCT LITERATURE

☐ **NOT ACCEPTED**

☐ **RECEIVED TOO LATE**

BY: _____ DATE: _____
REMARKS: _____

END OF SECTION

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. Requests for Information (RFIs).
 - 4. On-line Project file.
 - 5. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Requirements:
 - 1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
 - 2. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

1.2 DEFINITIONS

- A. RFI: Request from Owner, Construction Manager, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.3 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use form acceptable to Construction Manager. Include the following information in tabular form:
 - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Within ten (10) days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project. Keep list current at all times.
 - 1. Post paper copies of list in project meeting room, in temporary field office, and by each temporary telephone.

1.4 GENERAL COORDINATION PROCEDURES

- A. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.

- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of Contractor's construction schedule.
 - 2. Preparation of the schedule of values.
 - 3. Installation and removal of temporary facilities and controls.
 - 4. Delivery and processing of submittals.
 - 5. Progress meetings.
 - 6. Preinstallation conferences.
 - 7. Project closeout activities.
 - 8. Startup and adjustment of systems.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
 - 1. Refer to Section 017419 "Construction Waste Management and Disposal" for additional requirements.

1.5 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
 - 1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - f. Indicate required installation sequences.
 - g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:
 - 1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
 - 2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
 - 3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
 - 4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
 - 5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
 - 6. Mechanical and Plumbing Work: Show the following:

- a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
 - 7. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
 - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
 - 8. Fire-Protection System: Show the following:
 - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
 - 9. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.
 - 10. Coordination Drawing Prints: As deemed necessary by Construction Manager, prepare coordination drawing prints according to requirements in Section 013300 "Submittal Procedures."
- C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
- 1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
 - 2. File Submittal Format: Submit or post coordination drawing files using Portable Data File (PDF) format.
 - 3. BIM File Incorporation: Develop and incorporate coordination drawing files into Building Information Model established for Project.
 - a. Refer to individual Scopes of Work for Trades required to perform three-dimensional component conflict analysis as part of preparation of coordination drawings. Resolve component conflicts prior to submittal. Indicate where conflict resolution requires modification of design requirements by Architect.
 - 4. Architect, through Construction Manager, will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
 - a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
 - b. Digital Drawing Software Program: The Contract Drawings are available in Revit version 2023 using Windows 11 operating system.
 - c. Contractor shall execute a data licensing agreement in the form of Agreement included in Project Manual.

1.6 REQUESTS FOR INFORMATION (RFIS)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
 - 1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
 - 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 - 1. Project name.
 - 2. Project number.
 - 3. Date.
 - 4. Name of Contractor.
 - 5. Name of Architect.
 - 6. Name of Construction Manager.
 - 7. RFI number, numbered sequentially.
 - 8. RFI subject.
 - 9. Specification Section number and title and related paragraphs, as appropriate.
 - 10. Drawing number and detail references, as appropriate.
 - 11. Field dimensions and conditions, as appropriate.
 - 12. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 - 13. Contractor's signature.

14. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: AIA Document G716 or a software-generated form with substantially the same content as indicated above, acceptable to Architect.
 1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- D. Architect's and Construction Manager's Action: Architect and Construction Manager will review each RFI, determine action required, and respond. Allow seven (7) working days for Architect's response for each RFI. RFIs received by Architect or Construction Manager after 1:00 p.m. will be considered as received the following working day.
 1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect and Construction Manager in writing within 10 days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly in form acceptable to Architect. Include the following:
 1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect.
 4. Name and address of Construction Manager.
 5. RFI number including RFIs that were returned without action or withdrawn.
 6. RFI description.
 7. Date the RFI was submitted to the Architect.
 8. Date Architect's and Construction Manager's response was received.
- F. On receipt of Architect's and Construction Manager's action, immediately distribute the RFI response to affected parties. Review response and notify Architect and Construction Manager within seven (7) days if Contractor disagrees with response.
 1. Change in Work shall be recorded to the Project Record set per Section 017839 "Project Record Documents".

1.7 PROJECT MEETINGS

- A. General: Construction Manager will schedule and conduct meetings and conferences at Project site unless otherwise indicated.
 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, Construction Manager, and Architect, within three (3) days of the meeting.
- B. Preconstruction Conference: Construction Manager will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
 1. Conduct the conference to review responsibilities and personnel assignments.

2. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, Construction Manager, Architect, and their consultants; each Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Lines of communications.
 - f. Procedures for processing field decisions and Change Orders.
 - g. Procedures for RFIs.
 - h. Procedures for testing and inspecting.
 - i. Procedures for processing Applications for Payment.
 - j. Distribution of the Contract Documents.
 - k. Submittal procedures.
 - l. Preparation of record documents.
 - m. Use of the premises.
 - n. Work restrictions.
 - o. Working hours.
 - p. Owner's occupancy requirements.
 - q. Responsibility for temporary facilities and controls.
 - r. Procedures for moisture and mold control.
 - s. Procedures for disruptions and shutdowns.
 - t. Construction waste management and recycling.
 - u. Parking availability.
 - v. Office, work, and storage areas.
 - w. Equipment deliveries and priorities.
 - x. First aid.
 - y. Security.
 - z. Progress cleaning.
 4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect, Construction Manager, and Owner's Commissioning Authority of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility requirements.
 - k. Time schedules.
 - l. Weather limitations.
 - m. Manufacturer's written instructions.
 - n. Warranty requirements.
 - o. Compatibility of materials.
 - p. Acceptability of substrates.
 - q. Temporary facilities and controls.
 - r. Space and access limitations.
 - s. Regulations of authorities having jurisdiction.

- t. Testing and inspecting requirements.
 - u. Installation procedures.
 - v. Coordination with other work.
 - w. Required performance results.
 - x. Protection of adjacent work.
 - y. Protection of construction and personnel.
3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: Construction Manager will schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 60 days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 2. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, Construction Manager, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of record documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Submittal of written warranties.
 - d. Requirements for preparing operations and maintenance data.
 - e. Requirements for delivery of material samples, attic stock, and spare parts.
 - f. Requirements for demonstration and training.
 - g. Preparation of Contractor's punch list.
 - h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - i. Submittal procedures.
 - j. Owner's partial occupancy requirements.
 - k. Installation of Owner's furniture, fixtures, and equipment.
 - l. Responsibility for removing temporary facilities and controls.
 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: Construction Manager will conduct progress meetings at **biweekly** intervals.
1. Coordinate dates of meetings with preparation of payment requests.
 2. Attendees: In addition to representatives of Owner, Owner's Commissioning Authority, Construction Manager, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Resolution of BIM component conflicts.
 - 4) Status of submittals.
 - 5) Status of sustainable design documentation.
 - 6) Deliveries.
 - 7) Off-site fabrication.
 - 8) Access.
 - 9) Site utilization.

- 10) Temporary facilities and controls.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Status of correction of deficient items.
 - 14) Field observations.
 - 15) Status of RFIs.
 - 16) Status of proposal requests.
 - 17) Pending changes.
 - 18) Status of Change Orders.
 - 19) Pending claims and disputes.
 - 20) Documentation of information for payment requests.
4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
 - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- F. Coordination Meetings: Construction Manager will conduct Project coordination meetings at **regular** intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: In addition to representatives of Owner, Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work. Owner's Commissioning Authority, Construction Manager, and Architect will attend as deemed necessary.
 2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each contractor present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Resolution of BIM component conflicts.
 - 4) Status of submittals.
 - 5) Deliveries.
 - 6) Off-site fabrication.
 - 7) Access.
 - 8) Site utilization.
 - 9) Temporary facilities and controls.
 - 10) Work hours.
 - 11) Hazards and risks.
 - 12) Progress cleaning.
 - 13) Quality and work standards.
 - 14) Change Orders.
 3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 013100

This page intentionally left blank

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Startup construction schedule.
 - 2. Contractor's construction schedule.
 - 3. Construction schedule updating reports.
 - 4. Daily construction reports.
 - 5. Material location reports.
 - 6. Site condition reports.
 - 7. Special reports.
- B. Related Requirements:
 - 1. Section 013300 "Submittal Procedures" for submitting schedules and reports.
 - 2. Section 014529 "Testing and Inspections" for submitting a schedule of tests and inspections.

1.2 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- D. Event: The starting or ending point of an activity.
- E. Float: The measure of leeway in starting and completing an activity.
 - 1. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 - 2. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- F. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.3 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
 - 1. Working electronic copy of schedule file, where indicated.
 - 2. PDF electronic file
- B. Startup construction schedule.
 - 1. Approval of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.

- C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
 - 1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.
- D. Construction Schedule Updating Reports: Submit with Applications for Payment.
- E. Daily Construction Reports: Submit at monthly intervals.
- F. Material Location Reports: Submit at monthly intervals.
- G. Site Condition Reports: Submit at time of discovery of differing conditions.
- H. Special Reports: Submit at time of unusual event.
 - 1. Adverse Weather Days: Document conditions affecting construction activities and submit within 24 hours of the event.

1.4 QUALITY ASSURANCE

- A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:
 - 1. Review software limitations and content and format for reports.
 - 2. Verify availability of qualified personnel needed to develop and update schedule.
 - 3. Discuss constraints, including phasing, work stages, area separations and interim milestones.
 - 4. Review delivery dates for Owner-furnished products.
 - 5. Review submittal requirements and procedures.
 - 6. Review time required for review of submittals and resubmittals.
 - 7. Review requirements for tests and inspections by independent testing and inspecting agencies.
 - 8. Review time required for Project closeout and Owner startup procedures, including commissioning activities.
 - 9. Review and finalize list of construction activities to be included in schedule.
 - 10. Review procedures for updating schedule.

1.5 COORDINATION

- A. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. Secure time commitments for performing critical elements of the Work from entities involved.
 - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
 - 1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
 - 2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.

3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
 4. Startup and Testing Time: Include no fewer than 20 days for startup and testing.
 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's and Construction Manager's administrative procedures necessary for certification of Substantial Completion.
 6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
 2. Work under More Than One Contract: Include a separate activity for each contract.
 3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner, if any.
 4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 6. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Uninterruptible services.
 - c. Use of premises restrictions.
 - d. Provisions for future construction.
 - e. Seasonal variations.
 - f. Environmental control.
 7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Mockups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.
 - j. Adjusting.
 - k. Curing.
 - l. Building flush-out.
 - m. Startup and placement into final use and operation.
 8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Temporary enclosure and space conditioning.
 - c. Permanent space enclosure.
 - d. Completion of mechanical installation.
 - e. Completion of electrical installation.
 - f. Substantial Completion.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.
- E. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.
1. See Section 012900 "Payment Procedures" for cost reporting and payment procedures.
- F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
1. Unresolved issues.

2. Unanswered Requests for Information.
 3. Rejected or unreturned submittals.
 4. Notations on returned submittals.
 5. Pending modifications affecting the Work and Contract Time.
- G. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
- H. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

2.2 STARTUP CONSTRUCTION SCHEDULE

- A. Bar-Chart Schedule: Submit startup, horizontal, bar-chart-type construction schedule within seven (7) days of date established for the Notice to Proceed or Notice of Award, whichever is earlier.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

- A. General: Prepare network diagrams using AON (activity-on-node) format.
- B. Startup Network Diagram: Submit diagram within 14 days of date established for the Notice to Proceed. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.
- C. CPM Schedule: Prepare Contractor's construction schedule using a time-scaled CPM network analysis diagram for the Work.
1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 30 days after date established for the Notice to Proceed.
 - a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.
 2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
 3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
 4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.
- D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.
1. Refer to Section 007300 for additional requirements.
- E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.
- F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities.
- G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
 2. Changes in early and late start dates.
 3. Changes in early and late finish dates.
 4. Changes in activity durations in workdays.
 5. Changes in the critical path.

6. Changes in total float or slack time.
7. Changes in the Contract Time.

2.4 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 30 days of date established for the Notice to Proceed or the Notice of Award, whichever is earlier. Base schedule on the startup construction schedule and additional information received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
 1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

2.5 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
 1. List of subcontractors at Project site.
 2. List of separate contractors at Project site.
 3. Approximate count of personnel at Project site.
 4. Equipment at Project site.
 5. Material deliveries.
 6. High and low temperatures and general weather conditions, including presence of rain or snow.
 7. Accidents.
 8. Meetings and significant decisions.
 9. Unusual events (see special reports).
 10. Stoppages, delays, shortages, and losses.
 11. Meter readings and similar recordings.
 12. Emergency procedures.
 13. Orders and requests of authorities having jurisdiction.
 14. Change Orders received and implemented.
 15. Construction Change Directives received and implemented.
 16. Services connected and disconnected.
 17. Equipment or system tests and startups.
 18. Partial completions and occupancies.
 19. Substantial Completions authorized.
- B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:
 1. Material stored prior to previous report and remaining in storage.
 2. Material stored prior to previous report and since removed from storage and installed.
 3. Material stored following previous report and remaining in storage.
- C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.6 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner, Architect and Construction Manager within two day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
 - 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 - 3. As the Work progresses, indicate final completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Architect, Construction Manager, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
 - 1. Post copies in Project meeting rooms and temporary field offices.
 - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200

SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Periodic construction photographs.
 - 3. Final completion construction photographs.
- B. Related Requirements:
 - 1. Section 017700 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.
 - 2. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.2 INFORMATIONAL SUBMITTALS

- A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
- B. Digital Photographs: Submit image files within three days of taking photographs.
 - 1. Submit photos by uploading to web-based project software site or via email. Include copy of key plan indicating each photograph's location and direction.
 - 2. Identification: Provide the following information with each image description:
 - a. Name of Project.
 - b. Name and contact information for photographer.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Date photograph was taken.
 - f. Description of location, vantage point, and direction.
 - g. Unique sequential identifier keyed to accompanying key plan.

1.3 FORMATS AND MEDIA

- A. Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of 12 megapixels, and at an image resolution of not less than 3200 by 2400 pixels. Use flash in low light levels or backlit conditions.
- B. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
- C. Metadata: Record accurate date and time from camera.
- D. File Names: Name media files with date, Project area, and sequential numbering suffix.

1.4 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs with maximum depth of field and in focus.
 - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Preconstruction Photographs: Before starting construction, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.
 - 1. Flag construction limits before taking construction photographs.

2. Take a minimum of 20 photographs to show existing conditions adjacent to property before starting the Work.
 3. Take a minimum of 20 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
 4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
- C. Periodic Construction Photographs: Take a minimum of 20 photographs biweekly. Select vantage points to show status of construction and progress since last photographs were taken.
- D. Final Completion Construction Photographs: Take a minimum of 20 photographs after date of Substantial Completion for submission as Project Record Documents. Architect will inform photographer of desired vantage points.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 013233

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Requirements:
 - 1. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
 - 2. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
 - 3. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
 - 4. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and Record Product Data.
 - 5. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.2 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's and Construction Manager's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's and Construction Manager's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- C. Digital File Transfer: Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. A cloud-based ShareFile exchange which allows internal and external users to access files.
- D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.3 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and Construction Manager and additional time for handling and reviewing submittals required by those corrections.
 - 1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 - 2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 - 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
 - 4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.

- f. Scheduled date for Architect's and Construction Manager's final release or approval.
- g. Scheduled date of fabrication.
- h. Scheduled dates for installation.
- i. Scheduled dates for purchasing.
- j. Activity or event number.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect, through the Construction Manager to Contractor, at a nominal cost, for use in preparing submittals.
 - 1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.
 - a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 - b. Digital Drawing Software Program: The Contract Drawings are available in Revit version 2023 using Windows 101 operating system.
 - c. Contractor shall execute a data licensing agreement form furnished by the Architect.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 - 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect and Construction Manager reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Construction Manager's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - 1. It is expected that the number of submittals sent to the Architect and the Architect's Consultants within any one-week period will be reasonable in number as to not create "undue hardship."
 - 2. It is expected that all submittals will be submitted within the durations outlined in the bid form as provided by each trade.
 - a. A \$100.00 per calendar day penalty will be assessed for any submittal received after durations received as provided by each trade. The penalty will be deducted from the contract through deductive change order. Only if written authorization from the Construction Manager to extend this time frame can this "per day" penalty not be enforced.
 - b. The completion time of the contract will not be extended for delays caused by tardiness of submittals. Cost of such delays shall not be borne by the Owner and may be back-charged as necessary.
 - 1) Contractor shall assume full responsibility for providing materials as specified at their risk to maintain schedule if submittals are not submitted within durations provided on the bid form.
 - c. Upon receipt of unapproved submittals, Contractors will have seven (7) calendar days to revise and resubmit. After such time, the penalty outlined above in 1.4 C.1.a will be assessed.
 - 3. Initial Review: Allow 10 **business** days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Construction Manager will advise Contractor when a submittal being processed must be delayed for coordination.
 - 4. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 - 5. Resubmittal Review: Allow 7 **business** days for review of each resubmittal.
 - 6. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 **business** days for initial review of each submittal.
 - 7. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 **business** days for review of each submittal. Submittal will be returned to Construction Manager, through Architect, before being returned to Contractor.
- D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 2. Name file with submittal number or other unique identifier, including revision identifier.
 - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., OMLC-079200.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., OMLC-079200.01.A).
 - b. Specific material/product identifier: After listing the project identifier and section number as described above, clearly indicate the material/product submitted corresponding to specific paragraph in the specification (e.g., Silicone Joint Sealant – 2.2.A).
 3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect and Construction Manager.
 4. Transmittal Form for Electronic Submittals: Use software-generated form from electronic project management software or electronic form acceptable to Owner, containing the following information:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name of Construction Manager.
 - e. Name of Contractor.
 - f. Name of firm or entity that prepared submittal.
 - g. Names of subcontractor, manufacturer, and supplier.
 - h. Category and type of submittal.
 - i. Submittal purpose and description.
 - j. Specification Section number and title.
 - k. Specification paragraph number or drawing designation and generic name for each of multiple items.
 - l. Drawing number and detail references, as appropriate.
 - m. Location(s) where product is to be installed, as appropriate.
 - n. Related physical samples submitted directly.
 - o. Indication of full or partial submittal.
 - p. Transmittal number numbered consecutively.
 - q. Submittal and transmittal distribution record.
 - r. Other necessary identification.
 - s. Remarks.
 5. Metadata: Include the following information as keywords in the electronic submittal file metadata:
 - a. Project name.
 - b. Number and title of appropriate Specification Section.
 - c. Manufacturer name.
 - d. Product name.
- E. Options: Clearly identify options requiring selection by Architect.
- F. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect and Construction Manager on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 3. Resubmit submittals until they are marked with approval notation from Architect's and Construction Manager's action stamp.
 4. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
 - a. **[FOR GC ONLY]**
- H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's and Construction Manager's action stamp.

PART 2 PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
1. Submit electronic submittals via email as PDF electronic files.
 - a. Architect, through Construction Manager, will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 - b. Along with the electronic submittal, Contractor shall submit to the Architect, one (1) full sized hard copy of each shop drawing for review and approval, as deemed necessary by the Architect.
 - c. Along with the electronic submittal, contractors shall submit to the Construction Manager, one (1) color deck or color card for each submittal requiring color selection for review, approval and color selection, as deemed necessary by the Architect.
 2. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
 - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
 3. Submittals shall constitute an implied statement by the General Contractor and Subcontractor that the submitted items comply with the following statements:
 - a. Items have been reviewed and accepted by the General Contractor and Subcontractor.
 - b. Items have been verified and coordinated with specifications, measurements, conditions, and relevant criteria of the Contract Documents.
 - c. Items can be fabricated and delivered to the project site within the proposed project schedule.
 4. Review of submittals by the Architect and/or Owner shall not relieve the Contractor from full compliance with the Construction Documents.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to clearly show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts/decks.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before or concurrent with Samples and Shop Drawings, as applicable.
 6. Submit Product Data in the following format:
 - a. PDF electronic file according to Paragraph 2.1 A.1.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Architect's digital data drawing files is otherwise permitted.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.

- c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 - 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
 - 3. Submit Shop Drawings in the following format:
 - a. PDF electronic file according to Paragraph 2.1 A.1.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
- 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 - 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.
 - e. Specification paragraph number and generic name of each item.
 - 3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
 - 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 - 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Sample for "initial selection" shall be listed as a separate item in the submittal schedule.
 - b. Number of Samples: Unless specifically required otherwise in Specification Section, submit one full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect, through Construction Manager, will return submittal with options selected.
 - 6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three sets of Samples. Architect and Construction Manager will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
 - 7. Electronic Transmittal: Provide PDF transmittal for all physical Samples. Include digital image file illustrating Sample characteristics, and identification information for record.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
- 1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 - 2. Manufacturer and product name, and model number if applicable.
 - 3. Number and name of room or space.
 - 4. Location within room or space.
 - 5. Submit product schedule in the following format:
 - a. PDF electronic file.

- F. Coordination Drawing Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."
- G. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."
- H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures."
- I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."
- J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."
- K. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."
- L. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- R. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- S. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- T. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - 1. Name of evaluation organization.
 - 2. Date of evaluation.
 - 3. Time period when report is in effect.
 - 4. Product and manufacturers' names.
 - 5. Description of product.
 - 6. Test procedures and results.
 - 7. Limitations of use.
- U. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- V. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

- W. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- X. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file in addition to three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.
- C. BIM File Incorporation: Incorporate delegated-design drawing and data files into Building Information Model established for Project.
 - 1. Prepare delegated-design drawings in the following format: Same digital data software program, version, and operating system as the original Drawings.

PART 3 EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect and Construction Manager.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S AND CONSTRUCTION MANAGER'S ACTION

- A. Action Submittals: Contractor is responsible for conforming and correlating dimensions at job sites for tolerances, clearances, quantities, fabrication processes, coordination of the Work with multiple trades, and full compliance with the Contract Documents. The Architect will review submittals for general conformance with the Contract Documents. Architect and Construction Manager will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect and Construction Manager will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action as follows:
 - 1. No Exception Taken: Signifies item represented in the submittal conforms to the design intent, complies with the intent of the Contract Documents and is acceptable for incorporation into the Work. Contractor is to proceed with fabrication or procurement and related work.
 - 2. Exceptions Noted: Signifies item represented in the submittal conforms to the design concept, complies with the intent of the Contract Documents, and is recommended for incorporation into the Work in accordance with the Architect's and/or Consultant's notations. Contractor is to proceed with the work in

- accordance the Architect's and/or Consultant's notations marked on the returned submittal or letter of transmittal. Resubmittal is not required.
3. Revised and Resubmit: Signifies item represented in the submittal appears to conform to the design concept and comply with the intent of the Contract Documents, but information is either insufficient or contains discrepancies which prevent the Architect and/or his Consultant from completing his review. Contractor is to resubmit revised information. Fabrication or procurement of the item and related work is not to proceed until the submittal is acceptable.
 4. Not Accepted: Signifies item represented in the submittal does not conform to the design concept or comply with the intent of the Contract Documents and is not recommended for incorporation into the Work. Contractor shall submit items responsive to the Contract Documents.
- B. Informational Submittals: Architect and Construction Manager will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect and Construction Manager will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect and Construction Manager.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, Commissioning Authority, Construction Manager, or authorities having jurisdiction are not limited by provisions of this Section.
 - 4. Specific test and inspection requirements are not specified in this Section.

1.2 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect or Construction Manager.
- C. Mockups/Field Samples: Full-size physical assemblies that are constructed on-site. Mockups/field samples are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups/Field Samples are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
 - 1. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.
 - 2. Integrated Field Samples: Field samples of select portions exterior envelope or interior construction erected as part of the Work. Field samples may consist of multiple products, assemblies, and subassemblies.
 - 3. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes; doors; windows; millwork; casework; specialties; furnishings and equipment; and lighting.
- D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- J. Experienced: When used with an entity or individual, "experienced" means, unless otherwise specified in the individual specification section, having successfully completed a minimum of five (5) previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

1.4 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.
 - 1. Whenever Contract Documents reasonably infer materials or installation as necessary to produce the intended results, but do not fully detail or specify such materials, the Contractor shall provide the more expensive method or material, or greater quantity, unless he has obtained a written decision from the Architect.

1.5 ACTION SUBMITTALS

- A. Shop Drawings: For integrated exterior mockups/field samples, provide plans, sections, and elevations, indicating materials and size of mockup construction.
 - 1. Indicate manufacturer and model number of individual components.
 - 2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.
- B. Delegated-Design Services Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.6 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:
 - 1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.

2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.
- C. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- D. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
1. Specification Section number and title.
 2. Entity responsible for performing tests and inspections.
 3. Description of test and inspection.
 4. Identification of applicable standards.
 5. Identification of test and inspection methods.
 6. Number of tests and inspections required.
 7. Time schedule or time span for tests and inspections.
 8. Requirements for obtaining samples.
 9. Unique characteristics of each quality-control service.

1.7 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
1. Project quality-control manager may also serve as Project superintendent.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
 2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
 3. Owner-performed tests and inspections indicated in the Contract Documents, including tests and inspections indicated to be performed by the Commissioning Authority.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.8 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
1. Date of issue.
 2. Project title and number.
 3. Name, address, and telephone number of testing agency.
 4. Dates and locations of samples and tests or inspections.
 5. Names of individuals making tests and inspections.

6. Description of the Work and test and inspection method.
 7. Identification of product and Specification Section.
 8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.
- B. **Manufacturer's Technical Representative's Field Reports:** Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of technical representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- C. **Factory-Authorized Service Representative's Reports:** Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of factory-authorized service representative making report.
 2. Statement that equipment complies with requirements.
 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 4. Statement whether conditions, products, and installation will affect warranty.
 5. Other required items indicated in individual Specification Sections.
- D. **Permits, Licenses, and Certificates:** For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.9 QUALITY ASSURANCE

- A. **General:** Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. **Manufacturer Qualifications:** A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. **Fabricator Qualifications:** A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. **Installer Qualifications:** A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
1. Refer to individual specification sections for additional requirements.
- E. **Professional Engineer Qualifications:** A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. **Specialists:** Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 - 1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - f. When testing is complete, remove test specimens, assemblies, and mockups; do not reuse products on Project.
 - 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, through Construction Manager, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect or Construction Manager.
 - 2. Notify Architect and Construction Manager seven days in advance of dates and times when mockups will be constructed.
 - 3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
 - 4. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 5. Obtain Architect's and Construction Manager's approval of mockups before starting work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.
 - 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 7. Unless otherwise indicated in the Contract Documents, demolish and remove mockups when directed unless otherwise indicated.
- L. Integrated Exterior Mockups: Construct integrated exterior mockup as indicated on Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials.
- M. Field Samples: Construct/apply field samples using required materials, products, finishes and assemblies, finished according to requirements for the completed work. Provide required lighting and additional lighting where required to enable Architect to evaluate quality of the Work:
 - 1. Build field sample of size indicated or, if not indicated, as directed by Architect.
 - 2. Notify Architect three (3) days in advance of dates and times when field samples will be constructed/applied.

3. Notify Architect and Construction Manager seven (7) days in advance of dates and times when field sample will be constructed/applied.
4. Demonstrate the proposed aesthetic effects and workmanship to be incorporated into the Work.
5. Obtain Architect's approval of field sample before starting remainder of work.
 - a. Allow three (3) days for initial review and each re-review of each field sample.
6. Field samples not acceptable to Architect shall be re-constructed/re-applied until field sample is accepted to Architect.
7. Maintain field sample during construction in an undisturbed condition as a standard for judging the completed Work.
8. Unless otherwise indicated in the Contract Documents, dispose of field sample when directed by Architect and Owner.

1.10 QUALITY CONTROL

- A. **Owner Responsibilities:** Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. **Contractor Responsibilities:** Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
 1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. **Manufacturer's Field Services:** Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."
- D. **Manufacturer's Technical Services:** Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. **Retesting/Reinspecting:** Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- F. **Testing Agency Responsibilities:** Cooperate with Architect, Commissioning Authority, Construction Manager, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 1. Notify Architect, Commissioning Authority, Construction Manager, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.

5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of Contractor.
- G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
1. Distribution: Distribute schedule to Owner, Architect, Commissioning Authority, Construction Manager, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.11 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified testing agency or special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
 2. Notifying Architect, Commissioning Authority, Construction Manager, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect and Commissioning Authority, through Construction Manager, with copy to Contractor and to authorities having jurisdiction.
 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 6. Retesting and reinspecting corrected work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
1. Date test or inspection was conducted.
 2. Description of the Work tested or inspected.
 3. Date test or inspection results were transmitted to Architect.
 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's, Commissioning Authority's, and Construction Manager's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 014200 - REFERENCES

PART 1 GENERAL

1.1 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.2 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.3 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
 - 1. AABC - Associated Air Balance Council; www.aabc.com
 - 2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
 - 3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
 - 4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
 - 5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
 - 6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
 - 7. ABMA - American Boiler Manufacturers Association; www.abma.com.
 - 8. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.

9. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
10. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
11. AF&PA - American Forest & Paper Association; www.afandpa.org.
12. AGA - American Gas Association; www.aga.org.
13. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
14. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
15. AI - Asphalt Institute; www.asphaltinstitute.org.
16. AIA - American Institute of Architects (The); www.aia.org.
17. AISC - American Institute of Steel Construction; www.aisc.org.
18. AISI - American Iron and Steel Institute; www.steel.org.
19. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
20. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
21. ANSI - American National Standards Institute; www.ansi.org.
22. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
23. APA - APA - The Engineered Wood Association; www.apawood.org.
24. APA - Architectural Precast Association; www.archprecast.org.
25. API - American Petroleum Institute; www.api.org.
26. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
27. ARI - American Refrigeration Institute; (See AHRI).
28. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
29. ASCE - American Society of Civil Engineers; www.asce.org.
30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
31. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
32. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
33. ASSE - American Society of Safety Engineers (The); www.asse.org.
34. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
35. ASTM - ASTM International; www.astm.org.
36. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
37. AWEA - American Wind Energy Association; www.awea.org.
38. AWI - Architectural Woodwork Institute; www.awinet.org.
39. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
40. AWPA - American Wood Protection Association; www.awpa.com.
41. AWS - American Welding Society; www.aws.org.
42. AWWA - American Water Works Association; www.awwa.org.
43. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
44. BIA - Brick Industry Association (The); www.gobrick.com.
45. BICSI - BICSI, Inc.; www.bicsi.org.
46. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.org.
47. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
48. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bwfbadminton.org.
49. CDA - Copper Development Association; www.copper.org.
50. CEA - Canadian Electricity Association; www.electricity.ca.
51. CEA - Consumer Electronics Association; www.ce.org.
52. CFFA - Chemical Fabrics and Film Association, Inc.; www.chemicalfabricsandfilm.com.
53. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
54. CGA - Compressed Gas Association; www.cganet.com.
55. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
56. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
57. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
58. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
59. CPA - Composite Panel Association; www.compositepanel.org.
60. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
61. CRRC - Cool Roof Rating Council; www.coolroofs.org.
62. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
63. CSA - Canadian Standards Association; www.csa.ca.
64. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
65. CSI - Construction Specifications Institute (The); www.csiresources.org.
66. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
67. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
68. CWC - Composite Wood Council; (See CPA).

69. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
70. DHI - Door and Hardware Institute; www.dhi.org.
71. ECA - Electronic Components Association; (See ECIA).
72. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
73. ECIA - Electronic Components Industry Association; www.eciaonline.org.
74. EIA - Electronic Industries Alliance; (See TIA).
75. EIMA - EIFS Industry Members Association; www.eima.com.
76. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
77. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
78. ESTA - Entertainment Services and Technology Association; (See PLASA).
79. EVO - Efficiency Valuation Organization; www.evo-world.org.
80. FCI - Fluid Controls Institute; www.fluidcontrolsintstitute.org.
81. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
82. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
83. FM Approvals - FM Approvals LLC; www.fmglobal.com.
84. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
85. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; www.floridarooft.com.
86. FSA - Fluid Sealing Association; www.fluidsealing.com.
87. FSC - Forest Stewardship Council U.S.; www.fscus.org.
88. GA - Gypsum Association; www.gypsum.org.
89. GANA - Glass Association of North America; www.glasswebsite.com.
90. GS - Green Seal; www.greenseal.org.
91. HI - Hydraulic Institute; www.pumps.org.
92. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
93. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
94. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
95. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
96. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
97. IAS - International Accreditation Service; www.iasonline.org.
98. IAS - International Approval Services; (See CSA).
99. ICBO - International Conference of Building Officials; (See ICC).
100. ICC - International Code Council; www.iccsafe.org.
101. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
102. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
103. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
104. IEC - International Electrotechnical Commission; www.iec.ch.
105. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
106. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
107. IESNA - Illuminating Engineering Society of North America; (See IES).
108. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
109. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
110. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.okstate.edu.
111. ILI - Indiana Limestone Institute of America, Inc.; www.ili.ai.
112. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
113. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
114. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
115. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
116. ISO - International Organization for Standardization; www.iso.org.
117. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
118. ITU - International Telecommunication Union; www.itu.int/home.
119. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
120. LMA - Laminating Materials Association; (See CPA).
121. LPI - Lightning Protection Institute; www.lightning.org.
122. MBMA - Metal Building Manufacturers Association; www.mbma.com.
123. MCA - Metal Construction Association; www.metalconstruction.org.
124. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
125. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
126. MHIA - Material Handling Industry of America; www.mhia.org.
127. MIA - Marble Institute of America; www.marble-institute.com.

128. MMPA - Moulding & Millwork Producers Association; www.wmmpa.com.
129. MPI - Master Painters Institute; www.paintinfo.com.
130. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
131. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
132. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
133. NADCA - National Air Duct Cleaners Association; www.nadca.com.
134. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
135. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
136. NBI - New Buildings Institute; www.newbuildings.org.
137. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
138. NCMA - National Concrete Masonry Association; www.ncma.org.
139. NEBB - National Environmental Balancing Bureau; www.nebb.org.
140. NECA - National Electrical Contractors Association; www.necanet.org.
141. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
142. NEMA - National Electrical Manufacturers Association; www.nema.org.
143. NETA - InterNational Electrical Testing Association; www.netaworld.org.
144. NFHS - National Federation of State High School Associations; www.nfhs.org.
145. NFPA - National Federation of State High School Associations; www.nfpa.org.
146. NFPA - NFPA International; (See NFPA).
147. NFRC - National Fenestration Rating Council; www.nfrc.org.
148. NHLA - National Hardwood Lumber Association; www.nhla.com.
149. NLGA - National Lumber Grades Authority; www.nlga.org.
150. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
151. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
152. NRCA - National Roofing Contractors Association; www.nrca.net.
153. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
154. NSF - NSF International; www.nsf.org.
155. NSPE - National Society of Professional Engineers; www.nspe.org.
156. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
157. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
158. NWFA - National Wood Flooring Association; www.nwfa.org.
159. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
160. PDI - Plumbing & Drainage Institute; www.pdionline.org.
161. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
162. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
163. RFCI - Resilient Floor Covering Institute; www.rfci.com.
164. RIS - Redwood Inspection Service; www.redwoodinspection.com.
165. SAE - SAE International; www.sae.org.
166. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
167. SDI - Steel Deck Institute; www.sdi.org.
168. SDI - Steel Door Institute; www.steeldoor.org.
169. SEFA - Scientific Equipment and Furniture Association (The); www.sefalabs.com.
170. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
171. SIA - Security Industry Association; www.siaonline.org.
172. SJI - Steel Joist Institute; www.steeljoist.org.
173. SMA - Screen Manufacturers Association; www.smainfo.org.
174. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
175. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
176. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
177. SPIB - Southern Pine Inspection Bureau; www.spib.org.
178. SPRI - Single Ply Roofing Industry; www.spri.org.
179. SRCC - Solar Rating & Certification Corporation; www.solar-rating.org.
180. SSINA - Specialty Steel Industry of North America; www.ssina.com.
181. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
182. STI - Steel Tank Institute; www.steeltank.com.
183. SWI - Steel Window Institute; www.steelwindows.com.
184. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
185. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
186. TCNA - Tile Council of North America, Inc.; www.tileusa.com.
187. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
188. TIA - Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.

189. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
 190. TMS - The Masonry Society; www.masonrysociety.org.
 191. TPI - Truss Plate Institute; www.tpinst.org.
 192. TPI - Turfgrass Producers International; www.turfgrasssod.org.
 193. TRI - Tile Roofing Institute; www.tilerroofing.org.
 194. UL - Underwriters Laboratories Inc.; www.ul.com.
 195. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
 196. USAV - USA Volleyball; www.usavolleyball.org.
 197. USGBC - U.S. Green Building Council; www.usgbc.org.
 198. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
 199. WASTEC - Waste Equipment Technology Association; www.wastec.org.
 200. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
 201. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
 202. WDMA - Window & Door Manufacturers Association; www.wdma.com.
 203. WI - Woodwork Institute; www.wicnet.org.
 204. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
 205. WWPA - Western Wood Products Association; www.wwpa.org.
- B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.
1. DIN - Deutsches Institut für Normung e.V.; www.din.de.
 2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
 3. ICC - International Code Council; www.iccsafe.org.
 4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.
- C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.
1. COE - Army Corps of Engineers; www.usace.army.mil.
 2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
 3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
 4. DOD - Department of Defense; www.quicksearch.dla.mil.
 5. DOE - Department of Energy; www.energy.gov.
 6. EPA - Environmental Protection Agency; www.epa.gov.
 7. FAA - Federal Aviation Administration; www.faa.gov.
 8. FG - Federal Government Publications; www.gpo.gov/fdsys.
 9. GSA - General Services Administration; www.gsa.gov.
 10. HUD - Department of Housing and Urban Development; www.hud.gov.
 11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
 12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
 13. SD - Department of State; www.state.gov.
 14. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
 15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
 16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
 17. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
 18. USP - U.S. Pharmacopeial Convention; www.usp.org.
 19. USPS - United States Postal Service; www.usps.com.
- D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
 2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
 3. DSCC - Defense Supply Center Columbus; (See FS).
 4. FED-STD - Federal Standard; (See FS).
 5. FS - Federal Specification; Available from DLA Document Services; www.quicksearch.dla.mil.
 - a. Available from Defense Standardization Program; www.dsp.dla.mil.
 - b. Available from General Services Administration; www.gsa.gov.

- c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org/ccb.
 - 6. MILSPEC - Military Specification and Standards; (See DOD).
 - 7. USAB - United States Access Board; www.access-board.gov.
 - 8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).
- E. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
- 1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
 - 2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
 - 3. CDHS; California Department of Health Services; (See CDPH).
 - 4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
 - 5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
 - 6. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.
 - 7. TFS; Texas A&M Forest Service; Sustainable Forestry and Economic Development; www.txforestservation.tamu.edu.
 - 8. Colorado Department of Public Health & Environment; www.colorado.gov/pacific/cdphe
 - 9. Colorado Air Quality Control Commission; www.colorado.gov/pacific/cdphe/aqcc
 - 10. Colorado Water Quality Control Division; www.colorado.gov/pacific/cdphe/wqcd
 - 11. Colorado Geological Survey; Land Use Regulations; www.coloradogeologicalsurvey.org/land-use-regulations/

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 014200

SECTION 014529 - TESTING AND INSPECTIONS

PART 1 - GENERAL

1.1 GENERAL

- A. The preceding "General Conditions" are a part of these specifications, and the Contractor shall consult them in detail in connection with this part of the work.

1.2 SCOPE OF WORK

- A. Employment of a testing and inspection firm approved and paid for by the Owner. Approximate scope of testing and inspection shall be as indicated on the drawings and herein specified in the sections of the specifications.
 - 1. Refer to attachment for scope of testing to be provided by Owner.

1.3 TESTING AND INSPECTION CHARGES

- A. For the following conditions, costs of testing and inspection services shall be paid for by the Contractor, apart from the Testing and Inspection.
 - 1. Costs arising from errors or omissions by the Contractor.
 - 2. Costs of concrete cores, of re-testing materials that fail, and of required identification of materials (mill tests, manufacturers certifications, etc.).
 - 3. Costs of test and inspections required to expedite the Contractors operations.

1.4 EARTHWORK

- A. The Soils Engineer shall be notified for inspection by the Contractor and shall work in cooperation with the Architect. This inspection shall be made before any excavation is attempted on the site. If any undesirable conditions are encountered during Construction, the Soils Engineer shall be notified so that supplemental recommendations can be made. Tests shall be made to define maximum densities of all compaction work. All densities shall be expressed as a relative compaction, in terms of the maximum dry density obtained in the laboratory. The Soils Engineer shall supervise all engineered fill and make field tests to ensure compliance with the required placement of footings; methods of placing and compacting fills; filter and/or rock fill materials.

1.5 CONCRETE WORK

- A. Reinforcement shall be positively identified by heat numbers and mill analysis. Otherwise, Contractor shall provide test by qualified laboratory, one test for each 5 tons or fraction thereof, each size and type of reinforcing steel. Cement shall be from tested bins and properly identified at the mixing plant. Contractor shall provide to the testing laboratory aggregate samples for approval. Testing laboratory shall prepare 3 concrete cylinders for each 25 cubic yards, or fraction thereof placed – 2 cylinders to be tested at 7 days, and 1 cylinder at 28 days. Follow ASTM standards throughout.

1.6 GENERAL TESTS AND INSPECTIONS

- A. Observe all building code test and inspection requirements. Notify proper State, County and City authorities, for their required inspections.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

END OF SECTION 014529

This page intentionally left blank

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
 - 1. Section 012100 "Allowances" for products selected under an allowance.
 - 2. Section 012200 "Unit Prices" for products selected under a unit price.
 - 3. Section 012300 "Alternates" for products selected under an alternate.
 - 4. Section 012500 "Substitution Procedures" for requests for substitutions.
 - 5. Section 014200 "References" for applicable industry standards for products specified.

1.2 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.
- C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications.

1.3 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
 - 2. Architects Action: For comparable products submitted for "Cause", if necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within fifteen (15) days of receipt of request, or seven (7) days of receipt of additional information or documentation, whichever is later. For comparable products submitted for "Contractor's Convenience", Contractor must submit all information necessary to make a direct comparison to specified product for Architect's review, no additional information may be submitted.
 - a. Form of Approval: As specified in Section 012500 "Substitution Procedures."
 - b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.4 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
 - 1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 - 2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- C. Storage:
 - 1. Store products to allow for inspection and measurement of quantity or counting of units.
 - 2. Store materials in a manner that will not endanger Project structure.
 - 3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
 - 4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
 - 5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 - 6. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 - 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 - 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
 - 3. The Contractor shall guarantee in writing to the Owner that all work performed, and all materials and equipment furnished under this contract are new and in accordance with the Contract Documents, are free from defects in equipment, materials or design furnished, or workmanship performed by the Contractor or any of his subcontractors or suppliers at any tier. Such guarantee shall continue for a period of twenty-four (24) months from the date of Final Completion of the work.
 - a. Where warranty duration specified in individual specification sections exceeds the 24-month minimum warranty, the longer warranty duration shall take precedence.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Architect will make selection.
 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
- B. Product Selection Procedures:
 1. Products:
 - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered prior to bidding only.
 - b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
 2. Manufacturers:
 - a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered prior to bidding only.
 - b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
 3. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
 1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 3. Evidence that proposed product provides specified warranty.
 4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 5. Samples, if requested.

PART 3 EXECUTION (NOT USED)

END OF SECTION 016000

SECTION 017310 - CUTTING AND PATCHING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. Related Sections include the following:
 - 1. Division 1 Section "Selective Demolition" for demolition of selected portions of the building for alterations.
 - 2. Division 7 Section "Through-Penetration Firestop Systems" for patching fire-rated construction.
 - 3. Divisions 2 through 33 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
 - a. Requirements in this Section apply to mechanical and electrical installations. Refer to Divisions 23 and 26 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.3 DEFINITIONS

- A. Cutting: Removal of existing construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 SUBMITTALS

- A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
 - 1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
 - 2. Changes to Existing Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
 - 3. Products: List products to be used and firms or entities that will perform the Work.
 - 4. Dates: Indicate when cutting and patching will be performed.
 - 5. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.
 - 6. Structural Elements: Where cutting and patching involve modifying structural elements, submit details and engineering calculations showing integration of modification with the original structure, stamped by a Professional Engineer licensed in the state of Kansas.
 - 7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive the right to later require removal and replacement of unsatisfactory work.

1.5 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
 - 1. Refer questions over systems believed to be structural to the Architect.
- B. Operational Elements: Do not cut and patch the following operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

1. Primary operational systems and equipment.
 2. Air or smoke barriers.
 3. Fire-protection systems.
 4. Control systems.
 5. Communication systems.
 6. Conveying systems.
 7. Electrical wiring systems.
- C. Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
1. Water, moisture, or vapor barriers.
 2. Membranes and flashings.
 3. Exterior curtain-wall construction.
 4. Equipment supports.
 5. Piping, ductwork, vessels, and equipment.
 6. Noise- and vibration-control elements and systems.
- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
1. If possible, retain original Installer or fabricator to cut and patch exposed Work listed below. If it is impossible to engage original Installer or fabricator, engage another recognized, experienced, and specialized firm.

1.6 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections of these Specifications.
- B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to avoid interruption of services to occupied areas.

3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete or Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Division 32 Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 - 4. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
 - 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.
- D. Patching and Repairing Existing Roof:
 - 1. Report discrepancies to Architect and Owner before disturbing existing conditions that could affect current warranty.
 - 2. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
 - 3. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
 - 4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
 - 5. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 - a. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

6. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during patching and repairing operations, by methods and with materials so as not to void existing warranties. Contractor to confirm materials used will not void existing warranties.

END OF SECTION 017310

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

- A. **[LEED CRITERIA ARE IN OTHER CH SECTION]**
- B. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous demolition waste.
 - 2. Disposing of nonhazardous demolition and construction waste.
- C. Related Requirements:
 - 1. Section 024119 "Selective Demolition" for disposition of waste resulting from partial demolition of buildings, structures, and site improvements.

1.2 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- E. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.3 INFORMATIONAL SUBMITTALS

- A. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- B. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.4 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

1. Comply with operation, termination, and removal requirements in Section 015000 "Temporary Facilities and Controls."
- B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
- C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 2. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

- A. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:
 1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 3. Store items in a secure area until installation.
 4. Protect items from damage during transport and storage.
 5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
- B. Salvaged Items for Owner's Use: Salvage items for Owner's use and handle as follows:
 1. Clean salvaged items.
 2. Store items in a secure area until delivery to Owner.
 3. Transport items to Owner's storage area designated by Owner.
- C. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.
- D. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.
- E. Plumbing Fixtures: Separate by type and size.
- F. Lighting Fixtures: Separate lamps by type and protect from breakage.
- G. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

3.3 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
- C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION 017419

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
 - 5. Repair of the Work.
- B. Related Requirements:
 - 1. Section 017300 "Execution" for progress cleaning of Project site.
 - 2. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 3. Section 017839 "Project Record Documents" for submitting record Drawings and record Product Data.
 - 4. Section 017900 "Demonstration and Training" for requirements for instructing Owner's personnel.

1.2 ACTION SUBMITTALS

- A. Product Data: For cleaning agents.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.3 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest control inspection.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.5 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of ten (10) days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
 - 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.
 - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.
 5. Submit test/adjust/balance records.
 6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of ten (10) days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 3. Complete startup and testing of systems and equipment.
 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
 6. Advise Owner of changeover in heat and other utilities.
 7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 9. Complete final cleaning requirements, including touchup painting.
 10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of ten (10) days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for final completion.

1.6 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit pest-control final inspection report.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are

outside the limits of construction. Use CSI Form 14.1A.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect
 - d. Name of Construction Manager.
 - e. Name of Contractor.
 - f. Page number.
4. Submit list of incomplete items in the following format:
 - a. PDF electronic file. Architect, through Construction Manager, will return annotated file.

1.8 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Partial Occupancy: Submit properly executed warranties within fifteen (15) days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
 1. General: Provide one (1) electronic copy and one (1) paper copy of warranties.
 2. Bind warranties and bonds in heavy-duty, three-ring, white vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 3. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 4. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
 5. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

1.9 PROJECT CLOSEOUT CHECK LIST

- A. Requirements: Contractor must provide the following prior to the Architect and Construction Manager approving the release of final payment:
 1. Verification that final punch list is complete.
 2. Final Affidavit.
 3. Consent of Surety.
 4. Final Lien Waiver.
 5. Affidavit of compliance with Prevailing Wage requirements.
 6. As-Built drawings applicable to this Contract.
 7. Operation and Maintenance Manuals applicable to this Contract.
 8. Current Insurance Certificate.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might

damage finished surfaces.

PART 3 EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - d. Remove snow and ice to provide safe access to building, as applicable.
 - e. Clean exposed exterior and interior hard-surface finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - g. Sweep concrete floors broom clean in unoccupied spaces.
 - h. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - i. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - j. Remove labels that are not permanent.
 - k. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - l. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - m. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - n. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
 - o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
 - p. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.
- D. Construction Waste Disposal: Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls."

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
 - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.

2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

This page intentionally left blank

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Emergency manuals.
 - 3. Operation manuals for systems, subsystems, and equipment.
 - 4. Product maintenance manuals.
 - 5. Systems and equipment maintenance manuals.
- B. Related Requirements:
 - 1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

1.2 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.3 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Architect and Commissioning Authority, as applicable, will comment on whether content of operations and maintenance submittals are acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
 - 1. General: Provide one (1) pdf electronic file and one (1) paper copy as follows:
 - a. PDF electronic file: Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
 - 1) Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
 - 2) Enable inserted reviewer comments on draft submittals.
 - b. Paper copy: Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect, through Construction Manager, will transmit paper copy to Owner upon acceptance.
- C. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least thirty (30) days before commencing demonstration and training. Architect and Commissioning Authority will return copy with comments.
 - 1. Correct or revise each manual to comply with Architect's and, as applicable, Commissioning Authority's comments. Submit copies of each corrected manual within ten (10) days of receipt of Architect's and Commissioning Authority's comments and prior to commencing demonstration and training.

PART 2 PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
 - 1. List of documents.
 - 2. List of systems
 - 3. List of equipment.
 - 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. General: Submit one (1) paper copy and one (1) copy in pdf electronic file format.
- B. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - 1. Title page.
 - 2. Table of contents.
 - 3. Manual contents.
- C. Title Page: Include the following information:
 - 1. Subject matter included in manual.
 - 2. Name and address of Project.
 - 3. Name and address of Owner.
 - 4. Date of submittal.
 - 5. Name and contact information for Contractor and Installer (if applicable).
 - 6. Name and contact information for Construction Manager.
 - 7. Name and contact information for Architect.
 - 8. Name and contact information for Commissioning Authority, as applicable.
 - 9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 - 10. Cross-reference to related systems in other operation and maintenance manuals.
- D. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
 - 1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- E. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- F. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- G. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, white vinyl-covered, post-type binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
 4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
 5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
1. Type of emergency.
 2. Emergency instructions.
 3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
1. Fire.
 2. Flood.
 3. Flood.
 4. Gas leak.
 5. Water leak.
 6. Power failure.
 7. Water outage.
 8. System, subsystem, or equipment failure.
 9. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping.
 2. Shutdown instructions for each type of emergency.
 3. Operating instructions for conditions outside normal operating limits.
 4. Required sequences for electric or electronic systems.
 5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
 - 1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 - 2. Performance and design criteria if Contractor has delegated design responsibility.
 - 3. Operating standards.
 - 4. Operating procedures.
 - 5. Operating logs.
 - 6. Wiring diagrams.
 - 7. Control diagrams.
 - 8. Piped system diagrams.
 - 9. Precautions against improper use.
 - 10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
 - 1. Product name and model number. Use designations for products indicated on Contract Documents.
 - 2. Manufacturer's name.
 - 3. Equipment identification with serial number of each component.
 - 4. Equipment function.
 - 5. Operating characteristics.
 - 6. Limiting conditions.
 - 7. Performance curves.
 - 8. Engineering data and tests.
 - 9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
 - 1. Startup procedures.
 - 2. Equipment or system break-in procedures.
 - 3. Routine and normal operating instructions.
 - 4. Regulation and control procedures.
 - 5. Instructions on stopping.
 - 6. Normal shutdown instructions.
 - 7. Seasonal and weekend operating instructions.
 - 8. Required sequences for electric or electronic systems.
 - 9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUALS

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Product Information: Include the following, as applicable:
 - 1. Product name and model number.
 - 2. Manufacturer's name.
 - 3. Color, pattern, and texture.
 - 4. Material and chemical composition.
 - 5. Reordering information for specially manufactured products.

- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
 - 1. Inspection procedures.
 - 2. Types of cleaning agents to be used and methods of cleaning.
 - 3. List of cleaning agents and methods of cleaning detrimental to product.
 - 4. Schedule for routine cleaning and maintenance.
 - 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 - 1. Standard maintenance instructions and bulletins.
 - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 - 3. Identification and nomenclature of parts and components.
 - 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
 - 1. Test and inspection instructions.
 - 2. Troubleshooting guide.
 - 3. Precautions against improper maintenance.
 - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - 5. Aligning, adjusting, and checking instructions.
 - 6. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
 - 1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 - 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

PART 3 EXECUTION

3.1 MANUAL PREPARATION

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
 - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original project record documents as part of operation and maintenance manuals.
 - 2. Comply with requirements of newly prepared record Drawings in Section 017839 "Project Record Documents."
- G. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
 - 4. Miscellaneous record submittals.
- B. Related Requirements:
 - 1. Section 017300 "Execution" for final property survey.
 - 2. Section 017700 "Closeout Procedures" for general closeout procedures.
 - 3. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.2 CLOSEOUT SUBMITTALS

- A. General: Final Payment will not be made until Project Record Documents are submitted to, reviewed by and are acceptable to the Architect.
- B. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit copies of record Drawings as follows:
 - a. Initial Submittal:
 - 1) Submit one paper-copy set(s) of marked-up record prints.
 - 2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final Submittal:
 - 1) Submit PDF electronic files of scanned record prints and one (1) paper-copy set of marked-up record prints.
 - 2) Print each drawing, whether or not changes and additional information were recorded.
- C. Record Specifications: Comply with the following:
 - 1. Initial Submittal:
 - a. Submit one paper-copy set(s) of marked-up record specifications.
 - b. Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - 2. Final Submittal:
 - a. Submit PDF electronic files of scanned and marked-up record specifications.
- D. Record Product Data: Submit one (1) paper copy and one (1) annotated PDF electronic file and directory of each submittal.
 - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- E. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one (1) paper copy and one (1) annotated PDF electronic file and directory of each submittal.
- F. Reports: Submit written report weekly, indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

PART 2 PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one (1) set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations below first floor.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directive.
 - k. Changes made following Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Digital Data Files:
1. Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect and Construction Manager. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
 - a. Format: Annotated PDF electronic file with comment function enabled.
 - b. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
 - c. Refer instances of uncertainty to Architect through Construction Manager for resolution.
 - d. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.
 - 1) See Section 013300 "Submittal Procedures" for requirements related to use of Architect's digital data files.
 - 2) Architect will provide data file layer information. Record markups in separate layers.
- C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Format: Annotated PDF electronic file with comment function enabled.

3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Construction Manager.
 - e. Name of Architect.
 - f. Name of Contractor.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
 5. Note related Change Orders, record Product Data, and record Drawings where applicable.
- B. Format: Refer to previous Article.

2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. Note related Change Orders and record Drawings where applicable.
- B. Format: Submit one (1) copy of record Product Data as scanned PDF electronic file(s) of marked-up paper copy of Product Data.
 1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as one PDF electronic file and a separate paper copy of marked-up miscellaneous record submittals].
 1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's and Construction Manager's reference during normal working hours.

END OF SECTION 017839 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.
 - 3. Pre-Produced demonstration and training videos.

1.2 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
 - 1. Indicate proposed training modules using manufacturer-produced (pre-produced) demonstration and training video recordings for systems, equipment, and products.
- B. Qualifications: For Instructor.
- C. Attendance Record: For each training module, submit list of participants and length of instruction time.

1.3 CLOSEOUT SUBMITTALS

- A. Pre-Produced Demonstration and Training Video Recordings: Submit two (2) copies within seven days of end of training.
 - 1. Identification: On each copy, provide an applied label with the following information:
 - a. Name of Project.
 - b. Name of Architect.
 - c. Name of Construction Manager.
 - d. Name of Contractor.
 - e. Date of video recording.
 - f. Name and address of videographer.
 - 2. Transcript: Prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.
 - 3. At completion of training, submit complete training manual(s) for Owner's use. One copy shall be prepared and bound in format matching operation and maintenance manuals, and the second copy shall be in PDF electronic file format on compact disc.

1.4 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.
- C. Pre-instruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
 - 1. Inspect and discuss locations and other facilities required for instruction.
 - 2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.

3. Review required content of instruction.
4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.5 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project record documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
 3. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
 4. Operations: Include the following, as applicable:
 - a. Startup and shutdown procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.

- h. Normal shutdown instructions.
- i. Operating procedures for emergencies.
- j. Operating procedures for system, subsystem, or equipment failure.
- k. Seasonal and weekend operating instructions.
- l. Required sequences for electric or electronic systems.
- m. Special operating instructions and procedures.
- 5. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
- 6. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
- 7. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
- 8. Repairs: Include the following:
 - a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART 3 EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module.
Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."
- B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 - 1. Coordinate with Owner for number of participants, instruction times and location.
 - 2. Describe system design, operational requirements, criteria, and regulatory requirements.
 - 3. Owner will furnish Contractor with names and positions of participants.
 - a. Owner will have in attendance a participant to describe Owner's operational philosophy.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - 1. Schedule training with Owner, through Construction Manager, with at least seven (7) days' advance notice.
 - a. Notify Architect in writing of training schedule.
- D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

- E. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

- A. Pre-Produced Video Recordings. Video recordings may be used as a component of each training module. Upon completion of training, furnish to Owner one (1) copy of each video used for training.

END OF SECTION 017900

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Demolition and removal of selected portions of building or structure as indicated, and as required to accommodate new construction.
 - 2. Salvage of existing items to be reused or recycled.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
 - 2. Section 017300 "Execution" for cutting and patching procedures.
 - 3. Section 311000 "Site Clearing" for site clearing and removal of above- and below-grade improvements not part of selective demolition.

1.2 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.
- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.3 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
 - 1. Owner will retain "first right of refusal" for all demolished items.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.4 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site.
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - 5. Review areas where existing construction is to remain and require protection.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Proposed Protection Measures: Submit report, including Drawings, that indicate the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- C. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Use of elevator and stairs.
 - 5. Coordination of Owner's continuing occupancy of portions of existing building to ensure uninterrupted progress of Owner's on-site operations and of Owner's partial occupancy of completed Work.
- D. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations.
 - 1. Comply with Section 013233 "Photographic Documentation." Submit before Work begins.
- E. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
- F. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.6 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.
 - 1. Prior to commencement of demolition, representatives of the Owner and the Contractor will inspect the project areas where work will be conducted, and designate items to be salvaged. Items to be salvaged shall be identified by tagging/labeling and listed on the inventory.

1.7 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.8 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
 - 1. Before selective demolition, Owner will remove the following items:
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. Hazardous materials will be removed by Owner before the start of Work.
 - a. Scheduling and phasing of hazardous materials removal shall be conducted prior to start of work in consultation with Contractor and Owner's forces. It may be necessary for portions of hazardous materials removal to occur after the start of construction. In such cases, areas where hazardous materials removal occurs shall be abandoned by Contractor during removal until hazardous materials removal is complete.

2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
 3. Contractor and Owner's forces shall each conduct work according to all applicable OSHA and EPA regulations.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
1. Maintain fire-protection facilities in service during selective demolition operations.

1.9 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor before proceeding. Existing warranties include the following:
1. Roof Warranty.
- B. Notify warrantor on completion of selective demolition and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

1.10 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate, and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- D. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.
- E. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.
1. Comply with requirements specified in Section 013233 "Photographic Documentation."
 2. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
 - 1. Comply with requirements for existing services/systems interruptions specified in Division 01 Section "Summary."
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
 - 2. Arrange to shut off utilities with utility companies.
 - 3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
 - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.
- C. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Comply with requirements for access and protection specified in Section 015000 "Temporary Facilities and Controls."
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 - 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 01 Section "Temporary Facilities and Controls."
- C. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.

3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 4. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."
- D. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
1. Strengthen or add new supports when required during progress of selective demolition.
- E. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering, and chopping. Temporarily cover openings to remain.
 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 5. Maintain adequate ventilation when using cutting torches.
 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 9. Locate temporary wall/knockout panels and remove to extent indicated, minimizing damage to existing adjacent construction to remain.
 10. Dispose of demolished items and materials promptly.
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C. Removed and Salvaged Items:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area designated by Owner.
 5. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.
- D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.
- E. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight.
 - 1. Remove existing roof membrane, flashings, copings, and roof accessories.
 - 2. Remove existing roofing system down to substrate.
- F. Wood Trim and Plaster: Carefully remove wood trim adjacent to interior plaster work to minimize damage to plaster work to remain. Remove loose plaster back to solid/sound plaster.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 - 4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.

3.7 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - 1. Slabs-on-grade.
 - 2. Concrete toppings.
- B. This Section also includes the following:
 - 1. Providing the granular drainage fill course beneath building floor slabs on grade.
 - 2. Providing foundation insulation.
- C. Related Requirements:
 - 1. Section 012100 "Allowances" for those allowances affecting work of this Section.
 - 2. Section 012200 "Unit Prices" for unit prices relating to work of this Section.

1.2 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, other pozzolans, and silica fume; materials subject to compliance with requirements.
- B. Design Reference Sample: Sample designated by Architect in the Contract Documents that reflects acceptable surface quality and appearance of cast-in-place architectural concrete.
- C. Reveal: Projection of coarse aggregate from matrix or mortar after completion of exposure operations.
- D. W/C Ratio: The ratio by weight of water to cementitious materials.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Architect and Engineer.
 - b. Contractor's superintendent.
 - c. Independent testing agency responsible for concrete design mixtures.
 - d. Owner's testing agency.
 - e. Ready-mix concrete manufacturer.
 - f. Concrete Subcontractor.
 - g. Flatwork technicians.
 - h. Manufacturer's representative for waterproofing admixture.
 - i. Concrete polishing subcontractor.
 - 2. Review special inspection and testing and inspecting agency procedures for the following:
 - a. Field quality control.
 - b. Concrete finishes and finishing.
 - c. Cold- and hot-weather concreting procedures.
 - d. Curing procedures.
 - e. Construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers.
 - f. Forms and form removal limitations.
 - g. Vapor-retarder installation.
 - h. Anchor rod and anchorage device installation tolerances.
 - i. Steel reinforcement installation.

- j. Methods for achieving specified floor and slab flatness and levelness.
- k. Measurement of floor and slab flatness and levelness.
- l. Perimeter insulation installation.
- m. Waterproofing admixture.
- n. Requirements for slabs to receive polished concrete.
- o. Concrete repair procedures.
- p. Concrete protection.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
 - a. Batch delivery tickets shall indicate batch weights as well as amount of available water to add on each delivery ticket.
- C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Jointing Layout: Submit floor plans indicating proposed layout and locations for joints required to construct the structure, including but not limited to the following:
 - 1. Location of expansion joints.
 - 2. Location of construction and control joints. Locations are subject to approval of the Architect.
 - 3. Include locations for decorative saw cutting of joints associated with floors indicated to receive polished concrete finish.
- E. Samples: For each of the following materials:
 - 1. Chamfers and rustications.
 - 2. Waterstops.
 - 3. Vapor retarder.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, manufacturer and testing agency.
- B. Welding certificates.
- C. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Steel reinforcement and accessories.
- D. Material Test Reports: For the following, from a qualified testing agency indicating compliance with requirements:
 - 1. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- E. Research/Evaluation Reports: For foam-plastic insulation, from ICC-ES.
- F. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.
- G. Field quality-control reports.
- H. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
 - 1. Installer of concrete topping slabs indicated to receive polished concrete finish and structural cast-in-place concrete slab shall be same as installer for polished concrete finishes.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
 - 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- E. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M.
- F. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- G. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
 - 1. Waterproofing (capillary break) admixture manufacturer will test new concrete slabs for permeability.
- H. Other Mockups: Cast concrete slab-on-grade and formed-surface panels to demonstrate typical joints, surface finish, texture, tolerances, floor treatments, and standard of workmanship.
 - 1. For each type of grind and finish level, pour and finish a separate slab-on-grade to be used for a field sample of the polished concrete. Size of field sample area shall not be less than 10 by 10 feet.
 - 2. Build panel approximately 100 sq. ft. for formed surface in the location indicated or, if not indicated, as directed by Architect.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion

1.7 PRECONSTRUCTION TESTING

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

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.

1.9 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.

2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.
- C. Concrete surfaces shall be protected by means recommended in writing my polishing product manufacturer.
1. Protection of Slabs to receive Polished Concrete Finishes: Refer to Section 033523 "Decorative Polished Concrete Finishes."

PART 2 PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
1. ACI 301.
 2. ACI 303.1.
 3. ACI 117.
 4. ACI 360.

2.2 FORM-FACING MATERIALS

- A. Form-Facing Panels for As-Cast Finishes: Exterior-grade plywood panels, nonabsorptive, that will provide continuous, true, and smooth architectural concrete surfaces, medium-density overlay, Class 1, or better, mill-applied release agent and edge sealed, complying with DOC PS 1.
- B. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
1. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
 2. Metal, or other approved panel materials.
- C. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- D. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.

2.4 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete

according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
2. Slab –on-grade supports: Provide supports specifically designed for bearing on soil.
3. Where legs of wire bar supports contact forms, use CRSI Class 1, gray, plastic-protected bar supports.

2.5 CONCRETE MATERIALS

- A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- B. Cementitious Materials:
 1. Portland Cement: ASTM C 150/C 150M, Type I or Type III, gray.
 2. Fly Ash: ASTM C 618, Class C.
 - a. Fly ash may not be used for concrete slabs on grade and elevated concrete slabs indicated to receive a polished concrete finish.
- C. Normal-Weight Aggregates: ASTM C 33/C 33M, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
 1. Maximum Coarse-Aggregate Size:
 - a. 1-inch nominal for slabs on grade and foundations.
 - b. 3/4-inch nominal for elevated slabs.
 - c. 3/8-inch nominal for concrete topping.
 - d. 3/4-inch nominal for all other locations.
 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
 3. Aggregate for Concrete Topping Slabs shall be sized with the following distribution per ASTM C117 and ASTM C136.
- D. Air-Entraining Admixture: ASTM C 260/C 260M.
- E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 2. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 3. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 4. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- F. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494/C 494M, Type C.
- G. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.
- H. Waterproofing (Capillary Break) Admixture: Admixture shall be formulated to react with water and alkali in the concrete to fill the capillaries within the concrete with calcium silicate hydrate. Admixture shall also have plasticizing properties. Admixture shall be used in lieu of a portion of the mix water, not in addition to the mix water.
 1. Manufacturer's Warranty: Submit manufacturer's standard warranty executed by an authorized company official. Manufacturer's warranty is in addition to, and not a limitation of other rights Owner may have under provisions of the Contract Documents.
 - a. Warranty Period: Ten (10) years commencing on the date of acceptance of the Project by Owner or date of Substantial Completion, whichever is earliest.
 - b. Warranty Terms: Terms to include moisture related failures, including all finish floor materials and labor.
 2. Admixture Manufacturers and Products:
 - a. Concre Systems; Concre.

- b. Specialty Products Group (SPG); VaporLock 20/20.
 - c. Barrier One International; Barrier One.
- 3. Accessories materials:
 - a. Topical vapor sealer as necessary when results from moisture testing by waterproofing admixture manufacturer indicate moisture vapor emission and/or relative humidity with slab exceeding acceptable levels.
- 4. Locations to receive Waterproofing Admixture:
 - a. New slabs-on-grade and elevated slabs.
 - b. Topping slabs over precast concrete.
 - c. Trenches within existing slabs-on-grade.
 - d. Use of waterproofing admixture at polished concrete shall be coordinated with concrete polisher prior to installation.
- I. Shrinkage Reducing Admixtures for Topping Slabs to Receive Polished Concrete Finish: Subject to compliance with requirements, provide "Eucon SRA Floor Shrinkage Reducing Admixture" or a comparable product submitted to and accepted by Architect prior to bidding with the following product characteristics:
 - 1. Classification: ASTM C494, Type S.
 - 2. Description: A liquid admixture design to reduce drying shrinkage by reducing the surface tension of the meniscus formed at the air-water interface in the pores.
- J. Water: ASTM C 94/C 94M and potable.

2.6 VAPOR RETARDERS

- A. Sheet Vapor Retarder: ASTM E 1745, Class A, except with maximum perm rating of 0.01 US perms, a minimum puncture resistance of 2260 grams and a minimum tensile strength of 57 lbf/in. Include manufacturer's recommended adhesive or pressure-sensitive tape.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Insulation Solutions, Inc.; Viper VaporCheck II, 15 mil, Class A.
 - b. Inteplast Group; Barrier-Bac VB-350, 16 mil.
 - c. Meadows, W. R., Inc.; Perminator 15 mil.
 - d. Poly-America; Husky Yellow Guard, 15 mil.
 - e. Raven Industries Inc.; Vapor Block 15.
 - f. Stego Industries, LLC.; Stego Wrap Vapor Barrier 15 mil.

2.7 GRANULAR DRAINAGE/ CAPILLARY BREAK MATERIAL

- A. Granular Drainage Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

2.8 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces, while improving slip resistance.
 - 1. Basis-of-Design Products: Subject to compliance with requirements, provide Curecrete Distribution Inc.; "Ashford Formula" or comparable product meeting specified performance requirements, submitted to and accepted by Architect prior to bidding.
 - 2. Performance Criteria:
 - a. Abrasion Resistance: Improves abrasion resistance by not less than 30 percent over untreated concrete when tested in accordance with ASTM C 779.
 - b. Coefficient of Friction: ASTM C 1028, on steel-troweled concrete samples versus tile, reduces slippage as follows:
 - 1) Dry: 0.71 untreated and with treatment not less than 0.86.
 - 2) Wet: 0.47 untreated and with treatment not less than 0.69.
 - c. Hardening: Improves hardness by not less than 35 percent over untreated concrete when tested in accordance with ASTM C 39 after 28 days.

- d. Impact Resistance: Improves impact resistance by not less than 13 percent over untreated concrete when tested in accordance with ASTM C 805, rebound number.
3. Basis-of-Design Products: Subject to compliance with requirements, provide Prosoco, Inc.; "Consolideck LS" or comparable product meeting specified performance requirements, submitted to and accepted by Architect prior to bidding.
 - a. Sealer, hardener and densifier - penetrating lithium silicate treatment - ideal for application to existing, cured concrete of any age - maybe applied to new concrete (verify).
 - b. Description: Clear premium sealer, hardener and densifier. This penetrating lithium silicate treatment reacts with the concrete to produce insoluble calcium silicate hydrate within the concrete pores. The treated surfaces resist damage from water and surface abrasion. The increased surface hardness reduces dusting and simplifies maintenance.
 - c. Performance Criteria:
 - 1) Form: Clear, colorless, odorless liquid.
 - 2) Specific Gravity: 1.10.
 - 3) pH: 11.0.
 - 4) Weight per Gallon: 9.2 pounds.
 - 5) Active Content: 14.5 percent.
 - 6) Total Solids: 14.5 percent.
 - 7) Flash Point: Not applicable.
 - 8) Freeze Point: 32 degrees Fahrenheit (0 degrees Celsius)
 - 9) Shelf Life: 2 years in unopened, factory-sealed container
 - 10) VOC Content: 0 grams per Liter. Complies with all known national, state and district AIM VOC regulations.
4. Products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.9 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Construction Chemicals - Building Systems; Confilm.
 - b. Conspec by Dayton Superior; Aquafilm.
 - c. Dayton Superior Corporation; Sure Film (J-74).
 - d. Euclid Chemical Company (The), an RPM company; Eucobar.
 - e. L&M Construction Chemicals, Inc.; E-CON.
 - f. Meadows, W. R., Inc.; EVAPRE.
 - g. SpecChem, LLC; Spec Film
 - h. Unitex; PRO-FILM.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
 1. For areas to receive decorative polished concrete, use membrane forming curing compound.
- C. Clear, Waterborne, Membrane-Forming Curing Compound (Exterior Slabs Only): ASTM C 309, Type 1, Class B, dissipating.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Construction Chemicals - Building Systems; Kure 200.
 - b. Conspec by Dayton Superior; W.B. Resin Cure.
 - c. Dayton Superior Corporation; Day-Chem Rez Cure (J-11-W).
 - d. Euclid Chemical Company (The), an RPM company; Kurez W VOX; TAMMSCURE WB 30C.
 - e. L&M Construction Chemicals, Inc.; L&M Cure R.
 - f. Meadows, W. R., Inc.; 1100-CLEAR.
 - g. SpecChem, LLC; Spec Rez Clear.
 2. Products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
 3. For use in areas with exterior concrete flatwork not indicated within Civil Drawings.

- D. Clear, Waterborne, Membrane-Forming Curing Compound (Polished Concrete Slabs Only): ASTM C 309, Type 1, Class A.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Bomanite; Clear Cure.
 - 2. Products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
 - 3. For use in areas with exposed polished concrete finish. Coordinate the use of this product with the work of polished concrete.

2.10 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or W. R. Meadows; "Deck-O-Foam". Thickness for expansion joint filler strip shall be ½ inch, unless otherwise indicated.
 - 1. For isolation joint filler strips, provide 30# asphalt saturated felt.
- B. Semi-rigid Joint Filler: Two-component, semi-rigid, 100 percent solids, aromatic polyurea with a Type A shore durometer hardness range of 85 to 95 per ASTM D 2240.
- C. Bonding Agent: ASTM C 1059/C 1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.
- D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
 - 1. Types I and II, nonload bearing and Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- E. Temporary Floor Protection System: Subject to compliance with requirements provide "Ram Board" by Ram Board or a comparable product submitted to and accepted by Architect prior to bidding with the following product characteristics.
 - 1. Description: Fiber-reinforced protection board designed to allow new concrete to cure while absorbing impacts
 - 2. Material Thickness: 46 mils
 - 3. Wall Guard Feature: Board shall be designed by manufacturer to fold for protection of adjacent walls up to 8 inches above finished floor.
 - 4. Floor protection systems requiring application of a liquid base coat shall be prohibited.
 - 5. Provide manufacturer's recommended seaming tape, vapor curing tape, and edge tape at locations recommended in writing by manufacturer.

2.11 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Basis of Design: Subject to compliance with requirements, Provide "Ultraplan 1 Plus" by MAPEI or a comparable product with the following characteristics .
 - 2. Cement Binder: ASTM C 150/C 150M, 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 gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
 - 5. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.12 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Use fly ash, as needed to reduce the total amount of portland cement, which would otherwise be used, by not more than 15 percent. Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash: 15 percent.
 - 2. Fly ash is not allowed in slabs on grade and elevated slabs indicated to receive the polished concrete finish.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 to 0.30 percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.
 - 4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.
 - 5. Use waterproofing (capillary break) admixture in concrete mixtures for slabs on grade and trenching repair for existing slabs on grade.
 - 6. Use shrinkage reducing admixture in concrete topping slabs and elevated slabs to receive a polished concrete finish.

2.13 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Slabs-on-Grade (Interior): Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength: 4000 psi at 28 days.
 - 2. Maximum Water-Cementitious Materials Ratio: Per drawings.
 - 3. Slump Limit: 4 inches, plus or minus 1 inch.
 - 4. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.14 FABRICATING REINFORCEMENT

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

2.15 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
 - 2. Waterproofing (Capillary Break) Admixture shall be added at the jobsite before discharge in accordance with admixture manufacturer's written instructions. The admixture manufacturer's representative shall be present at time of dosing admixture and initial concrete placement. Use for all concrete slabs on grade and elevated slabs.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
 - 1. For mixer capacity of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.

2. For mixer capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.
4. Waterproofing (Capillary Break) Admixture shall be added at the jobsite before discharge in accordance with admixture manufacturer's written instructions. The admixture manufacturer's representative shall be present at time of dosing admixture and initial concrete placement. Use for all concrete slabs on grade and elevated slabs.

PART 3 EXECUTION

3.1 FORMWORK INSTALLATION

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301 (ACI 301M), to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 (ACI 117M).
 1. Form recessed slabs as indicated.
- C. Utilize sides of trenches for forms whenever possible. Where sides of trenches cannot be used; design, erect, support and maintain formwork to support vertical, lateral, static and dynamic loads that might be applied until such loads can be supported by concrete structure.
- D. Limit deflection of form-facing panels to not exceed ACI 303.1 requirements.
- E. In addition to ACI 303.1 limits on form-facing panel deflection, limit cast-in-place concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
 1. Class A, 1/8 inch for smooth-formed finished surfaces.
 - a. Fins shall be ground smooth with adjacent concrete surface.
 2. Class C, 1/2 inch for rough-formed finished surfaces.
- F. Construct forms tight enough to prevent loss of concrete mortar.
- G. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 1. Kerf wood rustications, keyways, reglets, recesses, and the like, for easy removal.
 2. Do not use rust-stained steel form-facing material.
 3. Construct forms tight enough to prevent loss of concrete mortar.
- H. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- I. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- J. Chamfer exterior corners and edges of permanently exposed concrete.
- K. Ease edges of tread-to-riser transitions of concrete riser platforms of seating to dimension as indicated on the drawings.
- L. Form openings, chases, offsets, sinkages, keyways, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- M. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- N. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

- O. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.
 - 1. Coat contact surfaces of wood rustications and chamfer strips with sealer before placing reinforcement, anchoring devices, and embedded items.

3.2 EMBEDDED ITEM INSTALLATION

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.
 - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 75 percent of its 28-day design compressive strength.
 - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
 - 3. Do not cut or puncture vapor retarder.
 - 4. Schedule form removal to maintain surface appearance that matches approved field sample panels and mockups.
 - 5. Cut off and grind glass-fiber-reinforced plastic form ties flush with surface of concrete.
- B. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 75 percent of 28-day design compressive strength. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- C. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.
- D. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 GRANULAR DRAINAGE FILL

- A. Granular Drainage/Capillary Break Fill Course: Cover vapor retarder with not less than indicated depth of granular drainage fill material, moisten, and compact with mechanical equipment to elevation tolerances of plus 0 inch or minus 1/2 inch.
 - 1. Compaction Requirements: Compact to within 95 percent maximum density in accordance with ASTM C 698, Standard Proctor compaction, at workable moisture content.
 - 2. At trenches through existing slabs on grade, provide at additional granular drainage fill/capillary break material to achieve a thickness of not less than 4 inches.
 - 3. Refer to Section 313200 "Subsoil Stabilization" for additional requirements regarding granular drainage fill.

3.5 VAPOR-RETARDER INSTALLATION

- A. Sheet Vapor Retarders for Slabs on Grade: Following leveling and tamping of granular drainage fill course for building slabs on grade, place vapor retarder sheet with longest dimension parallel with direction of pour. Place, protect, and repair sheet vapor retarder according to ASTM E 1643, manufacturer's written instructions and as follows:
 - 1. Lap joints 6 inches and seal with manufacturers' recommended tape.

2. Lap vapor retarder over and seal to footings, foundation, strip footings, grade beam and any edge of slab that terminates at existing building conditions, as occurs.
3. Seal pipe penetrations with pipe boot made from vapor retarder material, seal with pressure sensitive tape and vapor retarder manufacturer's recommended mastic.
4. Repair punctures and tears with patches of vapor retarder material, lapping 6 inches on all sides and sealing with pressure sensitive tape.

3.6 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.7 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 5. Space vertical joints in walls at 100 feet maximum. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 8. At Load Transfer Joints: Provide one of the following:
 - a. 2 by 4 inch continuous keyway.
 - b. One #4 by 12 inch long smooth dowel.
 - c. Diamond dowel system.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
 - a. Where joints are not specifically indicated, space joints at 12 feet on center (area not to exceed 144 sq ft.). For polished concrete, space joints at 10 feet on center (area not to exceed 100 sq ft.).
 - b. Begin saw cutting of joint no later than 12 hours after finishing.
 - c. For topping slabs, space joints according to accepted layout plan and no greater than 8 feet on center each way.

- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
 - 2. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.8 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless water was withheld at batch plant, amount withheld was documented in writing and adding withheld water is acceptable to Architect.
- C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301 (ACI 301M).
 - a. Refer to ACI 303.1 for areas to receive architectural concrete finishes.
 - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
 - a. Do not permit vibrators to contact forms.
- D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Maintain reinforcement in position on chairs during concrete placement.
 - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 4. Slope surfaces uniformly to drains where required.
 - 5. Concrete slab repairs at trenches shall be flush with adjacent concrete surface.
 - 6. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- F. Hot-Weather Placement: Comply with ACI 301 and as follows:
 - 1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.9 FINISHING FORMED SURFACES

- A. General - Architectural Concrete Finish: Match Architect's design reference sample, identified and described as indicated, to satisfaction of Architect.
- B. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces not exposed to public view.
- C. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.
- D. Rubbed Finish: Apply the following to smooth-formed-finished as-cast concrete where indicated:
 - 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 - a. Apply to concrete surfaces exposed to public view on vertical surfaces of sides of ramps, at sides of stairs and at lightpole bases.
- E. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.10 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.
 - 1. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, and built-up or membrane roofing.
- C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 - 1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system. Do not burnish concrete.
 - 2. Finish surfaces to the following tolerances, according to ASTM E 1155 (ASTM E 1155M), for a randomly trafficked floor surface:
 - a. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.
 - b. Specified overall values of flatness, F(F) 30; with minimum local values of flatness of F(F) 24; for elevated slabs.
 - c. Specified overall values of flatness, F(F) 45; and of levelness, F(L) 35; with minimum local values of flatness, F(F) 30; and of levelness, F(L) 24, for slabs to receive polished concrete finish.
 - 3. Gymnasium Floor: Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch.
 - 4. Finish slab repairs at trenches to be flush with adjacent concrete surfaces.
- D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thinset method. While concrete is still plastic, slightly scarify surface with a fine broom.
 - 1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

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

3.11 MISCELLANEOUS CONCRETE ITEM INSTALLATION

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations:
 - 1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 - 2. Construct concrete bases 4 inches high unless otherwise indicated, and extend base not less than 6 inches (150 mm) in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
 - 3. Minimum Compressive Strength: 3500 psi (24.1 MPa) at 28 days.
 - 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 - 5. For supported equipment, install anchor bolts that extend through concrete base and anchor into structural concrete substrate.
 - 6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 7. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.
- D. Concrete Topping Slab: Concrete topping slab shall be installed in accordance with the following additional installation requirements.
 - 1. Installation of the concrete topping slab shall be coordinated with General Contractor, Polishing Contractor, and Concrete Installer to minimize the time and exposure to foot traffic of all other trades.
 - 2. General Contractor, Polishing Contractor, and Concrete Installer shall establish a date of concrete topping slab installation and coordinate this date with all trades, including concrete topping installer and polisher, prior to start of construction.

3.12 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 (ACI 301M) for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, as follows:
 - 1. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - a. Use moisture-retaining covers to cure concrete slab surfaces to receive all types of floor coverings.

- b. Use moisture-retaining covers to cure concrete slab surfaces to receive penetrating liquid floor treatments, sealed concrete floor treatments and decorative polished concrete floor treatment.
 - 2. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.
- F. Temporary Floor Protection System:
 - 1. Cover polished concrete floors with temporary floor protection system prior to and after completion of polished concrete floor finish.
 - 2. Temporary floor protection system shall be maintained in good condition as recommended by manufacturer until construction activities are complete.

3.13 LIQUID FLOOR TREATMENT APPLICATION

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
 - 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 28 days' old.
 - 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.
- B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.14 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least four month(s). Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.
 - 1. Where control/contraction joints extend to the exterior of the building, beyond aluminum storefront, curtain wall and similar framing, completely fill joints with semi-rigid joint filler from exterior to inside face of framing. Exposed joint shall be completely filled and made water-tight.
 - 2. Where control/contraction joints occur in floors indicated to receive penetrating sealed concrete finish.

3.15 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete. Limit cut depth to 3/4 inch (19 mm). Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and

- compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar matches surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
- 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 - 2. After concrete has cured at least 14 days, correct high areas by grinding.
 - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 - 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 - 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 - 6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 - 7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.16 FIELD QUALITY CONTROL

- A. Special Inspections and Testing: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
 - 1. Waterproofing (capillary break) admixture manufacturer shall test new concrete slabs for permeability.
- C. Inspections:
 - 1. Steel reinforcement placement.
 - 2. Steel reinforcement welding.
 - 3. Headed bolts and studs.
 - 4. Verification of use of required design mixture.
 - 5. Concrete placement, including conveying and depositing.
 - 6. Curing procedures and maintenance of curing temperature.
 - 7. Verification of concrete strength before removal of shores and forms from beams and slabs.
 - 8. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.
- D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 3. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below or 80 deg F (27 deg C) and above, and one test for each composite sample.
 5. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
 6. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - a. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
 7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
 8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
 9. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
 10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
 11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
 12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- E. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M) within 72 hours of initial concrete placement.

3.17 PROTECTION OF FLOOR TREATMENTS

- A. Protect floor treatments from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by floor treatments installer.

END OF SECTION 033000

SECTION 040100 - MASONRY RESTORATION AND CLEANING

PART 1 - GENERAL

1.1 SUMMARY

- A. Extent of masonry restoration work is indicated on drawings and as specified hereinafter.
- B. This Section includes, but is not limited to, the following masonry restoration and cleaning.
 - 1. Cleaning all exterior brick surfaces indicated to receive work on the drawings.
 - 2. 100% repointing of all brick mortar joints indicated to receive work on the drawings.
 - 3. Remove any downspouts and support hangers/brackets during cleaning and repointing.
 - 4. Remove any miscellaneous wood and metal fasteners on the masonry and repoint the holes. Verify first that these items serve no purpose.
 - 5. Replace damaged or missing brick.
 - 6. Mortar filling of all voids in brick joints to about 3/4" from surface of brick.
 - 7. Removal of plant growth and surface parging.
- C. Related Requirements:
 - 1. Section 012200 "Unit Price" for unit prices relating to work in this Section.
 - 2. Section 079200 "Joint Sealants".

1.2 DEFINITION

- A. Repointing: The process of raking out (removing) mortar and replacing it with new mortar.

1.3 QUALITY ASSURANCE

- A. Restoration Specialist: The repair and pointing shall be carried out by a firm having not less than seven (7) years successful experience under the current company name, in the cleaning, repair, joint raking and pointing of masonry similar to the work described in this Section.
 - 1. The Contractor shall submit all the following information demonstrating the masonry Contractor's qualifications and experience with the Bid for approval by the Architect and Owner. Contractors not submitting the required information or failing to meet the minimum requirements will be disqualified and will not be allowed to perform the work of this Section.
 - a. Provide written description of a minimum of three projects completed within the past five years for which the masonry Contractor has performed the masonry cleaning, pointing and repair. Projects must have been performed on properties 50 years old or older. Provide the name and address of the Project, the name and telephone number of the Owner and Architect, dates work was performed, and a description of the materials and methods used to perform the work for each project.
 - b. Submit a resume for each of the persons who will be supervising and performing the work of this Section demonstrating a minimum of three (3) years' experience working in their trades, list of three example projects describing the work the person has performed. Example projects can be the same or different than the example projects described for the said masonry Contractor described above. Only individuals whose resumes have been submitted, reviewed, and accepted will be allowed to perform the work of this Section.
 - c. The masonry Contractor's qualifications submittals shall be completed by the masonry Contractor and shall be signed by an authorized official of the firm and dated.
- B. Field-Constructed Mock-Ups: Prior to start of general masonry restoration, prepare the following sample panels on building where directed by Architect. Obtain Architect's acceptance of visual qualities before proceeding with the work. Retain acceptable panels in undisturbed condition, suitable marked, during construction as a standard for judging completed work.
 - 1. Cleaning and Paint Stripping: Demonstrate materials and methods to be used for cleaning and paint stripping of masonry surface and condition on sample panels of approximately 9 sq ft in area.
 - a. Test adjacent nonmasonry materials for possible reaction with cleaning materials.
 - b. Allow waiting period of duration indicated, but not less than seven (7) calendar days, after completion of sample cleaning to permit study of sample panels for negative reactions.

2. Repointing: Prepare a sample, areas of approximately 3' high by 3' wide for each type of repointing required, one for demonstrating methods and quality of workmanship expected in removal of mortar from joints and the other for demonstrating quality of materials and workmanship expected in pointing mortar joints. Architect shall observe work on field sample after raking and again after first layer of pointing.
 - a. The fundamental consideration for routing and pointing procedures shall be that the materials and techniques adopted do minimal or no damage to the masonry units while achieving the desired results.
 3. Concrete Patching: Prepare one sample as selected from damaged stone of the building by the Owner's Representative for demonstrating quality of patching and workmanship expected in patching of the concrete. This sample can be incorporated to the project.
 4. Mortar Filling: Prepare sample areas of approximately 3'-0" x 3'-0" for joint grouting. All extensive voids in brick joints shall be mortared full to about 3/4" of the finish face of brick to allow repointing of these joints.
- C. Source of Material: Obtain materials for masonry restoration from a single source for each type of material required to ensure match of quality, color, pattern, and texture.
- D. Owner Representative and/or Architect may randomly selected areas of tuckpointing to be raked for verification of the appropriate depth of pointing and void filling. Contractor shall bear the cost of repointing these areas of selected destructive testing in their base bid.
- E. Masonry Preconstruction Test Service:
1. Owner will employ separate testing laboratory to perform preconstruction testing.
 2. Preconstruction Brick Tests: Test each type of existing brick indicated for replacement and each type of proposed replacement brick, for properties indicated below, using methods of sampling and testing of ASTM C 67. Carefully remove existing bricks from locations designated by Architect.
 - a. Compressive strength.
 - b. 24-hour cold water absorption.
 - c. 5-hour boil absorption.
 - d. Saturation coefficient.
 - e. Initial rate of absorption (suction).
- F. Preconstruction Conference: Approximately two weeks prior to scheduled commencement of work of this Section, the General Contractor shall meet at Project site with Architect, Owner's Representative, masonry restoration Contractor, and each Subcontractor and other representatives directly concerned with performance of the work of this Section. General Contractor to record discussions of conference and decisions and agreements (or disagreements) reached and furnish copy of record to each party attending. Review foreseeable methods and procedures related to roofing work, including but not necessarily limited to the following:
1. Tour building exterior, inspect, identify, and discuss brick areas to be replaced. Limestone areas to be patched, limestone areas to be replaced, and discuss preparatory work to be performed by other trades.
 2. Locate mock-up sample areas and test areas.
 3. Review masonry restoration and cleaning requirements (drawings, specifications, and other Contract Documents.
 4. Review required submittals, both completed and yet to be completed.
 5. Review and finalize construction schedule related to work of this Section and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 6. Review required inspection, testing, certifying and material usage accounting procedures.
 7. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data for each product indicated including recommendations for their application and use. Include test reports and certifications substantiating that products comply with requirements.
- B. Restoration Program: Submit written program for each phase of restoration process including protection of surrounding materials on building and site during operations. Describe in detail materials, methods, and equipment to be used for each phase of restoration work.
- C. Samples: Submit, for verification purposes, prior to mock-up erection, samples of the following:
1. For replacement face bricks provide straps or panels containing not less than 8 units and representing the entire color range.
- D. Patching Mortar: Submit the following items in time to prevent delay of the work and to allow adequate time for review and resubmittal, if needed; do not order materials or start work before receiving the written approval:

1. Written certificates from the repair mortar manufacturer shall be submitted stating that all installers of the repair mortar have successfully completed the training workshop for installation of the mortar.
2. Samples of all specified materials and Material Safety Data Sheets (MSDS) as appropriate.
3. Certificates, except where the material is labeled with such certification, by the producers of the materials, that all materials supplied comply with all the requirements of these specifications and the appropriate standards.
4. Color-match patch samples fabricated on pieces of appropriate masonry from or on the building using the specified repair mortar as required.
5. Written verification that all specified items will be used. Provide purchase orders, shipping tickets, receipts, etc., to prove that the specified materials were ordered and received.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Carefully pack, handle, and ship masonry units and accessories strapped together in suitable packs or pallets or in heavy cartons. Unload and handle to prevent chipping and breakage.
- B. Deliver other materials to site in manufacturer's original and unopened containers and packaging, bearing labels as to type and names of products and manufacturers.
- C. Protect masonry restoration materials during storage and construction from wetting by rain, snow, or ground water, and from staining or intermixture with earth or other types of materials.
- D. Protect grout, mortar, and other materials from deterioration by moisture and temperature. Store in a dry location or in waterproof containers. Keep containers tightly closed and away from open flames. Protect liquid components from freezing. Comply with manufacturer's recommendations for minimum and maximum temperature requirements for storage.

1.6 PROJECT CONDITIONS

- A. Clean masonry surfaces only when air temperatures are 40 deg F (4 deg C) and above and will remain so until masonry has dried out, but for not less than 7 days after completion of cleaning.
- B. Do not repoint mortar joints or repair masonry unless air temperatures are between 40 deg F (4 deg C) and 80 deg F (27 deg C) and will remain so for at least 48 hours after completion of work.
- C. Prevent grout or mortar used in repointing and repair work from staining face of surrounding masonry and other surfaces. Remove immediately grout and mortar in contact with exposed masonry and other surfaces.
- D. Protect sills, ledges, and projections from mortar droppings.
- E. Do not apply water repellent treatments to wet surfaces or during rain or when there is a chance of rain within 24 hours after application without protection which will prevent wetting.
- F. Do not apply water repellent materials when winds are sufficient to carry airborne chemicals to unprotected surfaces.
- G. Provide protection and facilities necessary to maintain progress within schedule.

1.7 SEQUIENCING AND SCHEDULING

- A. Perform masonry restoration work in the following sequence:
 1. Repair existing masonry including replacing existing masonry with new masonry materials.
 2. Rake out existing mortar from joints indicated to be repointed.
 3. Repoint existing mortar joints of masonry indicated to be restored.
 4. Clean existing masonry surfaces.
 5. Sealants work by others must be completed.

PART 2 - PRODUCTS

2.1 MASONRY MATERIALS

- A. Face Brick and Accessories: Provide face brick and accessories, including units for lintels, arches, corners, and other special ground, cut, or sawed shapes where required to complete masonry restoration work.
 - 1. Provide units with color, surface texture and size to match existing brick work and with physical properties not less than those determined from preconstruction testing, of selected existing units.

2.2 MORTAR MATERIALS

- A. Portland Cement: ASTM C 150, Type I.
 - 1. For stonework and other masonry indicated, provide non staining white or gray cement complying with staining requirement of ASTM C 91 for not more than 0.03% water soluble alkali.
 - a. Intent is to match color.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Aggregate for Mortar: No. 1 Brick Sand (fine sand), free of loam, silt, and organic matter.
 - 1. Match size, texture, and gradation of existing mortar as closely as possible.
- D. Colored Mortar Pigment: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with record of satisfactory performance in masonry mortars.
- E. Water: Clean, free of oils, acids, alkalis, and organic matter.

2.3 CLEANING MATERIALS AND EQUIPMENT

- A. Water for Cleaning: Clean, potable, free of oils, acids, alkalis, salts, and organic matter.
- B. Warm Water: Heat water to temperature of 140 deg F 180 deg F (60 deg C 82 deg C).
- C. Brushes: Fiber bristle only.
- D. Brick Cleaner: Manufacturer's acidic masonry restoration cleaner composed of hydrofluoric acid blended with other acids including trace of phosphoric acid and combined with special wetting systems and inhibitors.
 - 1. Product: Subject to compliance with requirements, provide one of the following:
 - a. Sure Klean T-785 Heavy Duty Restoration Cleaner, ProSoCo, Inc.
 - b. Diedrich Chemicals.
- E. Concrete Cleaner:
 - 1. Product: Subject to compliance with requirements, provide Sure Klean Light Duty Concrete Cleaner by ProSoCo, Inc. or a comparable product submitted to and accepted by Architect prior to bidding.
- F. Protective Film: For windows, glass, metal, and polished stone surfaces during acidic and alkaline masonry cleaning, use self-adhesive, translucent polyethylene protective film.
 - 1. Products: 3M Long-mask Masking Tape #2090 and the self-adhesive, thin, window protection film by 3M, 3M Protective Tape 2A26B. Catalog No. RM2090, 24" or 35" side.
- G. Spray Equipment: Provide equipment for controlled spray application of water and chemical cleaners, if any, at rates indicated for pressure, measured at spray tip, and for volume.
 - 1. For spray application of chemical cleaners provide low-pressure tank or chemical pump suitable for chemical cleaner indicated, equipped with cone-shaped spray-tip.
 - 2. For spray application of water provide fan-shaped spray-tip which disperses water at angle of not less than 45 degrees.

2.4 MORTAR MIXES

- A. Existing mortar to be analyzed by Owner's Testing Laboratory as a part of this Contract to establish existing mix, presence of portland and compressive strength. New mortar to have no more portland content than original.
- B. Measurement and Mixing: Measure cementitious and aggregate material in a dry condition by volume or equivalent weight. Do not measure by shovel, use known measure. Mix materials in a clean mechanical batch mixer.
- C. Do not use admixtures of any kind in mortar, unless otherwise indicated.
- D. Mortar proportions:
 - 1. Pointing mortar for brick: One part gray portland cement, three parts lime and eight to twelve parts natural mortar aggregate.
 - 2. Rebuilding mortar shall be the same as pointing mortar.
 - 3. Intent is for cured mortar to match color, texture and not exceed compressive strength of original mortar.

2.5 CHEMICAL CLEANING SOLUTIONS

- A. General: Unless otherwise indicated, dilute chemical cleaning materials with water to produce solutions of concentration indicated but not greater than that recommended by chemical cleaner manufacturer.
- B. Acidic Cleaner Solution for Brick: Diluted with four parts water to one part cleaning solution.
- C. Chemical Paint Remover: In concentration recommended by chemical cleaner manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

- A. General: Comply with recommendations of manufacturers of chemical cleaners for protecting building surfaces against damage from exposure to their products.
- B. Protect persons, motor vehicles, surrounding surfaces of buildings whose masonry surfaces are being restored, building site, and surrounding buildings from injury resulting from masonry restoration work.
 - 1. Prevent chemical cleaning solutions from coming into contact with pedestrians, motor vehicles, landscaping, buildings and other surfaces which could be injured by such contact.
 - 2. Do not clean masonry during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
 - 3. Dispose of run off from cleaning operations by legal means and in manner which prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.
 - 4. Erect temporary protection covers over pedestrian walkways and at points of entrance and exit for persons and vehicles which must remain in operation during course of masonry restoration work.
- C. Protect glass, unpainted metal trim and polished stone from contact with acidic chemical cleaners by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape. Apply masking agent to comply with manufacturer's recommendations. Do not apply liquid masking agent to painted or porous surfaces.
- D. Protect unpainted metal from contact with alkali chemical cleaners and water repellent by covering them either with liquid strippable masking agent or polyethylene film and waterproof masking tape.
- E. Containment of all runoff related to cleaning masonry will be a must in order to minimize impact on surrounding vegetation; Contractor is responsible to meet all local, state and federal regulations in each masonry cleaners' application, handling, and disposal. ProSoCo indicates that containment and proper disposal of Sure Klean 509 paint stripper is without exception always regulated due to the petroleum base products it contains.

3.2 CLEANING EXISTING MASONRY, GENERAL

- A. Proceed with cleaning in an orderly manner; work from top to bottom of each scaffold width and from one end of each elevation to the other.
- B. Use only those cleaning methods indicated for each masonry material and location.
- C. Perform each cleaning method indicated in a manner which results in uniform coverage of all surfaces, including corners, moldings, interstices and which produces an even effect without streaking or damage to masonry surfaces.
- D. Rinse off chemical residue and soil by working upwards from bottom to top of each treated area at each stage or scaffold setting.
- E. Water Application Methods: Spray Applications: Spray water to masonry surfaces to comply with requirements indicated for location, purpose, water temperature, pressure, volume and equipment. Unless otherwise indicated, hold spray nozzle not less than 6" from surface of masonry and apply water from side to side in overlapping bands to produce uniform coverage and an even effect.
 - 1. Low Pressure Spray: 100 400 psi; 3 6 gallons per minute.
 - 2. Medium Pressure Spray: 400 800 psi; 3 6 gallons per minute (only upon approval of Architect).
 - 3. Steam Wash: Apply steam to masonry surfaces at pressures not exceeding 80 psi. Hold nozzle no less than 6" from surface of masonry and apply steam from side to side or in direction of tooling in overlapping bands to produce uniform coverage and an even effect.
- F. Chemical Cleaner Application Methods: Use only when directed by Architect, after performing water only cleaning methods described above.
 - 1. General: Apply chemical cleaners to masonry surfaces to comply with chemical manufacturer's recommendations using brush or spray application methods, at Contractor's option, unless otherwise indicated. Do not allow chemicals to remain on surface for periods longer than that indicated or recommended by manufacturer.
 - 2. Spray Application: Apply to pressures not exceeding 50 psi, unless otherwise indicated.
 - 3. Reapplication of Chemical Cleaners: Do not apply chemical cleaners to same masonry surfaces more than twice.

3.3 CLEANING BRICKWORK

- A. Cold Water Wash: At locations indicated, clean brick masonry surface with cold water applied as follows:
 - 1. Low pressure spray.
 - 2. Medium pressure spray.
- B. Warm Water Wash: At locations indicated, clean brick masonry surfaces with warm water applied as follows:
 - 1. Low pressure spray.
 - 2. Medium pressure spray.
- C. Chemical Cleaning: At locations indicated, clean brick masonry surfaces with acidic cleaner applied as follows:
 - 1. Prewet masonry with cold water applied by low pressure spray.
 - 2. Prewet masonry with warm water applied by low pressure spray.
 - 3. Apply acidic cleaner to masonry. Let cleaner remain on surface for period indicated below before rinsing away:
 - a. As recommended by chemical cleaner manufacturer.
 - b. 2 to 3 minutes.
 - 4. Rinse masonry with cold water to remove chemicals and soil, applied by medium pressure spray.
 - 5. Repeat chemical cleaning procedure above where required to produce effect established by mock-up. Do not apply more than twice.
 - 6. Do not clean brick work prior to seven (7) days after completion of the tuckpointing.

3.4 BRICK REMOVAL AND REBUILDING

- A. Brick Removal

1. Locations of brick removal are shown on the drawings and include the following:
 - a. Bricks displaced out from original face of bricks around the windows and as shown on the drawings.
 - b. Damaged brick to be replaced as shown on the drawings and as required.
 - c. Retain (leave in place) brick which may be etched and carved by students as confirmed by Architect.
 2. Carefully remove by hand at locations indicated any brick which are damaged, spalled or deteriorated. Cut out full units from joint to joint and in manner to permit replacement with full size units. Small hand power saw (3-4" diameter) with 1/8" thick diamond blade could only be used for bed joints. Cut out head joints by hand with chisel and mallet only.
 3. Support and protect masonry indicated to remain which surrounds removal area.
 4. Salvage as many whole, undamaged bricks as possible.
 5. Remove mortar, loose particles, and soil from salvaged brick by cleaning with brushes and water. Store brick for reuse.
 6. Clean remaining brick at edges of removal areas by removing mortar, dust, and loose debris in preparation for rebuilding.
 7. Repair any damaged flashing to make watertight.
- B. Brick Rebuilding
1. Install new or salvaged brick to replace removed brick. Fit replacement units into bonding and coursing pattern of existing brick. If cutting is required use mortar driven saw designed to cut masonry with clean, sharp unchipped edges.
 2. Lay replacement brick with completely filled bed, head and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet clay brick which have ASTM C 67 initial rates of absorption (suction) of more than 30 grams per 30 sq. in. per minute. Use wetting methods which ensure that units are nearly saturated but surface dry when laid. Maintain joint width for replacement units to match existing.
 3. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork.
 4. Repoint new mortar joints in repaired area to comply with requirements for repointing existing masonry, except rake out joints before mortar sets.

3.5 REPOINTING EXISTING MASONRY

- A. Joint Raking:
1. Rake out mortar from joints to depths equal to 2 1/2 times their widths but not less than 1" nor less than that required to expose sound, unweathered mortar.
 2. Remove mortar from masonry surfaces within raked out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
 3. Do not spall edges of masonry units or widen joints. Replacement of masonry units which become damaged.
 - a. Cut out old mortar by hand with chisel and mallet, unless otherwise indicated.
 - b. For bed joints a small power operated rotary hand saw with 1/8" thick, 3" to 4" diameter diamond blade will be permitted but only on specific written approval of Architect based on submission by Contractor of a satisfactory quality control program and demonstrated ability of operators to use tools without damage to masonry.
- B. Joint Pointing:
1. Rinse masonry joint surfaces with water to remove any dust and mortar particles. Time application of rinsing so that, at time of pointing, excess water has evaporated or run off, and joint surfaces are damp but free of standing water.
 2. Fill the voids with pointing mortar in layers. Compact each layer and allow it to become thumbprint hard before applying the next layer. Fill the voids to about 1" from exposed face of bricks. Fill remaining 1" depth simultaneously with final pointing of entire brick facades.
 3. After joints have been filled to a uniform depth, place remaining pointing mortar in 2 layers with each of first and second layers filling approximately half of the overall depth. First layer shall have a raked square edge. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing bricks have rounded edges recess final layer slightly from face. Take care not to spread mortar over edges onto exposed masonry surfaces, or to feather edge mortar.
 4. When mortar is thumbprint hard, tool joints to match original appearance of joints, unless otherwise indicated. Remove excess mortar from edge of joint by brushing.
 5. Cure mortar by maintaining in a damp condition for not less than 72 hours. Provide temporary protection in areas exposed to direct sun.
 6. Where repointing work precedes cleaning of existing masonry hallow mortar to harden not less than seven (7) days before beginning cleaning work.

3.6 FINAL CLEANING

- A. After mortar has fully hardened thoroughly clean exposed masonry surfaces of excess mortar and foreign matter using stiff nylon or bristle brushes and clean water, spray applied at low pressure.
- B. Use of metal scrapers or brushes will not be permitted.
- C. Use of acid or alkali cleaning agents will not be permitted.
- D. Remove and dispose of waste, debris and masking materials following completion of consolidation operation. Leave surfaces and adjacent areas clean.
- E. Sweep and flush residue washed from building surface away from surrounding sidewalk and service areas nightly. Maintain premises clean and neat at all times.

END OF SECTION 040100

SECTION 040140 - STONE REPAIR

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Repairing stone masonry.
 - 2. Repairing and patching of sandstone.
 - 3. Removing abandoned anchors.
 - 4. Painting steel uncovered during the work.
- B. Related Requirements:
 - 1. Section 012100 "Allowances" for allowances relating to stone repair.
 - 2. Section 012200 "Unit Prices" for unit prices relating to work of this Section
 - 3. Section 012300 "Alternates" for alternates effecting work of this Section.
 - 4. Section 014000 "Quality Requirements" for independent testing agency procedures and administrative requirements.
 - 5. Section 024119 "Selective Demolition"
 - 6. Section 047200 "Cast Stone Masonry" for furnishing cast stone trim.
 - 7. Section 051200 "Structural Steel Framing" for installing anchor sections of adjustable masonry anchors for connecting to structural steel frame.
 - 8. Section 055000 "Metal Fabrications" for furnishing steel lintels and shelf angles for unit masonry.
 - 9. Section 072100 "Thermal Insulation" for cavity wall insulation.
 - 10. Section 072726 "Fluid-Applied Air Barrier Coating" for air barrier and transition membrane.
 - 11. Section 076200 "Sheet Metal Flashing and Trim."

1.2 DEFINITIONS

- A. Low-Pressure Spray: 100 to 400 psi (690 to 2750 kPa); 4 to 6 gpm (0.25 to 0.4 L/s)
- B. Rebuilding (Setting) Mortar: Mortar used to set and anchor masonry in a structure, distinct from pointing mortar installed after masonry is set in place.
- C. Rift: The most pronounced direction of splitting or cleavage of a stone.
- D. NOTE: Rift may be obscure in igneous rocks such as granite. Often it is obvious as with bedding planes in many sedimentary stones.
- E. Stone Terminology: ASTM C119.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Require representatives of each entity directly concerned with unit masonry to attend, including but not limited to the following:
 - a. Owner's representative
 - b. Architect and Engineer.
 - c. Contractor's superintendent.
 - d. Masonry subcontractor.
 - 2. Restoration Plan:
 - a. Measures for protection of surrounding materials on building and site.
 - b. In-situ masonry preparation prior to repair.
 - c. Removal of efflorescence (salt) from wall prior to repair.
 - d. Measures to reduce existing excess moisture from masonry.
 - e. Material curing methods after installation.
 - 3. Review methods and procedures related to stone repair including, but not limited to, the following:

- a. Verify stone repair specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
- b. Materials, material application, sequencing, tolerances, and required clearances.
- c. Quality-control program.
- d. Coordination with building occupants.

1.4 SEQUENCING AND SCHEDULING

- A. Work Sequence: Perform stone repair work in the following sequence, which includes work specified in this and other Sections:
 - 1. Remove plant growth.
 - 2. Inspect masonry for open mortar joints and permanently or temporarily point them before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
 - 3. Remove paint.
 - 4. Clean stone.
 - 5. Rake out mortar from joints surrounding stone to be replaced and from joints adjacent to stone repairs along joints.
 - 6. Repair stonework, including replacing existing stone with new stone.
 - 7. Rake out mortar from joints to be repointed.
 - 8. Point mortar and sealant joints.
 - 9. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.
 - 10. Where water repellents are to be used on or near stonework, delay application of these chemicals until after pointing and cleaning.
 - 11. Window replacement, coordinate with all trades.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 2. Include recommendations for product application and use.
 - 3. Include test data substantiating that products comply with requirements.
 - 4. Include Material Safety Data Sheets (MSDS) as appropriate.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, and locations of replacement stone units on the structure and their jointing, showing relation of existing and new or relocated units.
 - 2. Show partial replacement stone units (dutchmen).
 - 3. Indicate setting number of each new stone unit and its location on the structure in annotated plans and elevations.
 - 4. Show provisions for expansion joints or other sealant joints.
 - 5. Show provisions for flashing, lighting fixtures, conduits, and weep holes as required.
 - 6. Show replacement and repair anchors, including drilled-in pins. Include details of anchors within individual stone units, with locations of anchors and dimensions of holes and recesses in stone required for anchors, including direction and angle of holes for pins.
 - 7. Show locations of scaffolding and points of scaffolding in contact with masonry. Include details of each point of contact or anchorage.
- C. Samples for Initial Selection: For the following:
 - 1. Colored Mortar: Submit sets of mortar that will be left exposed in the form of sample mortar strips, 6 inches (150 mm) long by 1/2 inch (13 mm) wide, set in aluminum or plastic channels.
 - a. Each set contain a close color range of at least six samples of different mixes of colored sands and cements that produce a mortar matching the existing, cleaned mortar when cured and dry.
 - b. Submit with precise measurements on ingredients, proportions, gradations, and source of colored sands from which each Sample was made.
 - 2. Sand Types Used for Mortar: Minimum 8 oz. (240 mL) of each in plastic screw-top jars.
 - 3. Patching Compound: Submit sets of patching compound Samples in the form of plugs (patches in drilled holes) in sample units of stone representative of the range of stone colors on the building.
 - a. Have each set contain a close color range of at least six. Samples of different mixes of patching compound that matches the variations in existing stone when cured and dry.

4. Include similar Samples of accessories involving color selection.
- D. Samples for Verification: For the following:
1. Each type of replacement stone. Include sets of Samples to show full range of color, texture, grain, veining, and finish to be expected. Provide sets of at least three 12-by-12-inch (300-by-300-mm) Samples for each type, but no fewer than necessary to indicate full range and proportion of variations within range.
 2. Each type of patching compound in form of briquettes, at least 3 inches (75 mm) long by 1-1/2 inches (38 mm) wide. Document each Sample with manufacturer and stock number or other information necessary to order additional material.
 3. Each type of adhesive.
 4. Accessories: Each type of anchor, accessory, and miscellaneous support.

1.6 INFORMATIONAL SUBMITTALS

- A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.
1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.
- B. Qualification Data: For testing agency stone repair specialist including field supervisors and workers and testing service.
- C. Preconstruction Test Reports: For existing stone and mortar and replacement stone.
- D. Quality-control program.
- E. Material Certificates: For each type and size of the following:
1. Masonry units.
 - a. Include material test reports substantiating compliance with requirements.
 - b. For concrete masonry units, include data and calculations establishing average net-area compressive strength of units.
 - c. For concrete masonry units included within fire resistant construction, provide certificate from manufacturer indicating compliance with ACI 216.1, latest edition for production of fire rated concrete masonry products.
 2. Cementitious materials. Include name of manufacturer, brand name, and type.
 3. Mortar admixtures.
 4. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
 5. Grout mixes. Include description of type and proportions of ingredients.
 6. Reinforcing bars.
 7. Joint reinforcement.
 8. Anchors, ties, and metal accessories.
 9. Flexible flashing: Include independent testing to verify the 8 mil and 32 mil requirements.
- F. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.
- G. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.
1. Compressive strength of mortar shall not exceed that of adjacent stone units.
- H. Grout Procedures: Detailed description of methods, materials, and equipment to be used to comply with grouting requirements.
- I. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE

- A. Stone Repair Specialist Qualifications: Engage an experienced stone repair firm to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance. Experience in only installing standard unit masonry or new stone masonry is insufficient experience for stone repair work.
 - 1. Field Supervision: Stone repair specialist firms shall maintain experienced full-time supervisors on Project site during times that stone repair work is in progress.
 - 2. Stone Repair Worker Qualifications: When stone units are being patched, assign at least one worker per crew who is trained and certified by manufacturer of patching compound to apply its products.
- B. Quality-Control Program: Prepare a written quality-control program for this Project to systematically demonstrate the ability of personnel to properly follow methods and use materials and tools without damaging stonework. Include provisions for supervising performance and preventing damage.
- C. Mockups: Prepare mockups of stone repair to demonstrate aesthetic effects and to set quality standards for materials and execution and for fabrication and installation.
 - 1. Stone Repair: Prepare sample areas for each type of stone indicated to have repair work performed. If not otherwise indicated, size each mockup not smaller than two adjacent whole units or approximately 48 inches (1200 mm) in least dimension. Construct sample areas in locations in existing walls where directed by Architect unless otherwise indicated. Demonstrate quality of materials, workmanship, and blending with existing work. Include the following as a minimum:
 - a. Replacement: **Four** stone units replaced.
 - b. Partial Stone Replacement: Two partial stone replacements (dutchman repairs).
 - c. Stone Plug Repair: Two stone plug repairs for each type of stone indicated to be plugged.
 - d. Crack Injection: Apply crack injection in two separate areas, each approximately 36 inches (900 mm) long] as directed.
 - e. Patching: Three small holes at least 1 inch (25 mm) in diameter or as otherwise directed.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on stone units as follows:
 - 1. Provide test specimens as indicated and representative of proposed materials and existing construction.
 - 2. Replacement Stone: Test each proposed type of replacement stone according to ASTM C170/C170M for compressive strength, ASTM C99/C99M for modulus of rupture, and ASTM C97/C97M for absorption and bulk specific gravity.
 - 3. Existing Stone: Test each type of existing stone indicated for replacement according to ASTM C170/C170M for compressive strength, wet and dry, perpendicular and parallel to rift; ASTM C99/C99M for modulus of rupture, wet and dry, perpendicular and parallel to rift; and ASTM C97/C97M for absorption and bulk specific gravity. Carefully remove four existing stones from locations designated by Architect. Take testing samples from these stones.
 - a. NOTE: Usually test existing stone and mortar before preparing the Specifications, and delete "Existing Stone," "Existing Mortar," and "Temporary Patch" subparagraphs ABOVE.
 - 4. Existing Mortar: Test according to ASTM C1324, modified as agreed by testing service and Architect for Project requirements, to determine proportional composition of original ingredients, sizes and colors of aggregates, and approximate strength.
 - 5. Temporary Patch: As directed by Architect, provide temporary materials followed by permanent repairs at locations from which existing samples were taken.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver stone units to Project site strapped together in suitable packs or pallets or in heavy-duty crates and protected against impact and chipping.

- B. Deliver each piece of stone with code mark or setting number on unexposed face, corresponding to Shop Drawings, using nonstaining paint.
- C. Deliver packaged materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.
- D. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- E. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.
- F. Store sand where grading and other required characteristics can be maintained and contamination avoided.
- G. Handle stone to prevent overstressing, chipping, defacement, and other damage.

1.10 FIELD CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.
 - 2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythes and hold cover in place.
- B. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit stone repair work to be performed according to product manufacturers' written instructions and specified requirements.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Temperature Limits, General: Repair stone units only when air temperature is between 40 and 90 deg F (4 and 32 deg C) and is predicted to remain so for at least seven days after completion of the Work unless otherwise indicated.
- E. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 402/602-16. Comply with the following procedures for stone repair unless otherwise indicated:
 - 1. When air temperature is below 40 deg F (4 deg C), heat mortar ingredients, repair materials, and existing stone to produce temperatures between 40 and 120 deg F (4 and 49 deg C).
 - 2. When mean daily air temperature is below 40 deg F (4 deg C), provide enclosure and heat to maintain temperatures above 32 deg F (0 deg C) within the enclosure for seven days after repair.
 - 3. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- F. Hot-Weather Requirements: Protect stone repairs when temperature and humidity conditions produce excessive evaporation of water from mortar and patching materials. Provide artificial shade and wind breaks, and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F (32 deg C) and above unless otherwise indicated. Comply with hot-weather construction requirements contained in TMS 402/602-16.
- G. For manufactured repair materials, perform work within the environmental limits set by each manufacturer.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Source Limitations: Obtain each type of material for repairing stone (stone, cement, sand, etc.) from single source with resources to provide materials of consistent quality in appearance and physical properties.

2.2 STONE MATERIALS

- A. Stone Matching Existing: Natural building stone of variety, color, texture, grain, veining, finish, size, and shape that match existing stone and with physical properties within 10 percent of those determined from preconstruction testing of selected existing stone.
 - 1. For existing stone that exhibits a range of colors, texture, grain, veining, finishes, sizes, or shapes, provide stone that proportionally matches that range rather than stone that matches an individual color, texture, grain, veining, finish, size, or shape within that range.
- B. Cutting New Stone: Cut each new stone so that, when it is set in final position, the rift or natural bedding planes will match the rift orientation of existing stones.
 - 1.

2.3 MORTAR MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I or Type II, except Type III may be used for cold-weather construction; white or gray, or both where required for color matching of mortar.
 - 1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C114.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Masonry Cement: ASTM C91/C91M.
- D. Mortar Cement: ASTM C1329/C1329M.
- E. Mortar for Sandstone, Mineral Based Natural Repair:
 - 1. Formulation: Pre-blended, mineral-based, single component repair product.
 - 2. Color: Match to the existing in-situ masonry.
 - 3. Texture: Match to existing in-situ masonry.
 - 4. Basis of Design Product: Provide US Heritage Group " Heritage Masonry Repair Mortar HS60 Sandstone Patch" or approved equal submitted to Architect prior to bidding.
 - a. Compressive Strength ASTM - 109: 3,780 psi after 28 days; not to exceed adjacent units.
 - b. Bond Strength ASTM C-882: 1,625 psi.
 - c. Flexural Strength ASTM C-348: 1,233 psi.
 - d. Modulus of Elasticity ASTM-C-469: 1,700 ksi.
- F. Mortar Sand: ASTM C144.
 - 1. Exposed Mortar: Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.
 - 2. Colored Mortar: Natural sand or ground marble, granite, or other sound stone of color necessary to produce required mortar color.
- G. Mortar Pigments: ASTM C979/C979M, compounded for use in mortar mixes, and having a record of satisfactory performance in stone mortars.
 - 1. Use formulation that is vapor and water permeable (equal to or more than the stone), exhibits low shrinkage, has lower modulus of elasticity than stone units being repaired, and develops high bond strength to all types of stone.
 - 2. Use formulation having working qualities and retardation control to permit forming and sculpturing where necessary.
 - 3. Formulate patching compound in colors, textures, and grain to match stone being patched. Provide no fewer than three colors to enable matching of each piece of stone.

- H. Cementitious Crack Filler: Ultrafine superplasticized grout that can be injected into cracks, is suitable for application to wet or dry cracks, exhibits low shrinkage, and develops high bond strength to all types of stone.
- I. Stone-to-Stone Adhesive: Two-part polyester or epoxy-resin stone adhesive with a 15 to 45-minute cure at 70 deg F (21 deg C), recommended in writing by adhesive manufacturer for type of stone repair indicated, and matching stone color.
 - 1. Basis of Design Product: Provide Sika Chemical Corporation "Sikadur Lo Mod" or approved equal submitted to Architect prior to bidding.

2.4 ACCESSORY MATERIALS

- A. Stone Repair Anchors and Pins: Mechanical fasteners and pins of Type 316 stainless steel; designed for stone stabilization and pinning stone pieces; matching shape and size of existing anchors unless otherwise indicated.
- B. Setting Buttons and Shims: Resilient plastic, nonstaining to stone, sized to suit joint thicknesses and bed depths of stone units, less the required depth of pointing materials unless removed before pointing.
- C. Masking Tape: Nonstaining, nonabsorbent material; compatible with mortar, joint primers, sealants, and surfaces adjacent to joints; and that easily comes off entirely, including adhesive.
- D. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer according to MPI #23 (surface-tolerant, anticorrosive metal primer) or SSPC-Paint 20 or SSPC-Paint 29 zinc-rich coating.
 - 1. Surface Preparation: Use coating requiring no better than SSPC-SP 2, "Hand Tool Cleaning" surface preparation according to manufacturer's literature or certified statement.
 - 2. VOC Limit: Use coating with a VOC content of 400 g/L (3.3 lb/gal.) or less.
- E. Other Products: Select materials and methods of use based on the following, subject to approval of a mockup:
 - 1. Previous effectiveness in performing the work involved.
 - 2. Minimal possibility of damaging exposed surfaces.
 - 3. Consistency of each application.
 - 4. Uniformity of the resulting overall appearance.
 - 5. Do not use products or tools that could leave residue on surfaces.

2.5 MORTAR MIXES

- A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.
- B. Admixtures:
 - 1. Do not use admixtures in mortar unless otherwise indicated.
 - 2. No synthetic polymers or additives are permitted in the formulation.
 - 3. No air-entraining admixtures are permitted.
 - 4. No antifreeze compounds, chlorides or other additives are permitted.
 - 5. Color pigments are permitted only with prior written approval from the material manufacturer.
- C. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Architect's approval.
 - 1. Mortar Pigments: Where mortar pigments are indicated, do not add pigment exceeding 10 percent by weight of the cementitious or binder materials, except for carbon black which is limited to 2 percent, unless otherwise demonstrated by a satisfactory history of performance.
- D. Factory Mixes for Sandstone:
 - 1. Pre-blend all replacement materials into single containers in a factory-controlled environment.
 - 2. Mixing of individual ingredients at the construction site shall not be permitted.
 - 3. Match color and texture of replacement material to the original material.
 - 4. Mark all containers to include manufacturing date and batch number. Maintain production sampling procedures for each batch and shipment for quality control tracking purposes.
- E. For Finish Coat for Sandstone:
 - 1. Cement: Portland cement ASTM C 150, Type II, white.

2. Lime: ASTM C 207, Type S, high plasticity: Increases cohesion during mixing, slows down the rate of cure, and moderates the qualities which could cause an excessively strong and moisture- resistant cement repair to fail and damage old stone.
3. Sand:
 - a. Local natural sand, graded or masonry mortar and conforming to ASTM C 144.
 - b. Sand color, size, and texture should match the original as closely as possible to provide the proper visual characteristics without other additives. A sample of the sand is necessary for comparison to the original, and should be approved by the consultant before beginning re-pointing work.
 - c. The color of the sand shall be the primary factor used to make mortars which match existing adjacent fabrics.
- F. Crushed Sandstone:
 1. Best repairs contain actual sandstone; Use stone removed from the area to be repaired, or other old stone with the same qualities.
 2. Grind it fine enough to pass through a 16-mesh screen, and wash thoroughly.
- G. Dry Pigments:
 1. Use when available crushed stone is not sufficient to give a color match.
 2. Use stable fade-proof mineral oxide pigments either natural- or synthetic-fade.

PART 3 EXECUTION

3.1 REPAIR SPECIALIST

- A. Stone Repair Specialist Firms: Subject to compliance with requirements, have stone repair performed by the following firm that may provide stone repair include, but are not limited to, the following:
 1. WTI General Contracting a Subsidiary of Tremco, Inc.

3.2 PROTECTION

- A. Prevent mortar from staining face of surrounding stone and other surfaces.
 1. Cover sills, ledges, and other projecting items to protect them from mortar droppings.
 2. Keep wall area wet below rebuilding and repair work to discourage mortar from adhering.
 3. Immediately remove mortar splatters in contact with exposed stone and other surfaces.
- B. Remove downspouts and associated hardware adjacent to stone and store during stone repair. Reinstall when repairs are complete.
 1. Provide temporary rain drainage during work to direct water away from building.

3.3 STONE REPAIR, GENERAL

- A. Appearance Standard: Repaired surfaces are to have a uniform appearance as viewed from 20 feet (6 m) away by Architect.

3.4 PREPARATION FOR REPAIRS

- A. A. Remove all loose mortar and masonry prior to installation of the repair mortar. "Sound" masonry with a hammer to verify its integrity. If necessary, cut away an additional 1/2" of the substrate to ensure the surface to be repaired is solid and stable. Remove any sealant residue.
- B. B. Where cramp anchors, threaded rod anchors, or dowels have been cut and pieces remain embedded in the substrate: Anchors that are free of rust, solidly embedded, and do not project beyond the surface of the masonry unit may remain. All others should be removed.
- C. Cut the edges of the repair area to provide a minimum depth of 1/4". The edges of the repair should be square cut. Do not allow any feathered edges in the repair area.

- D. Install mechanical anchors in all repair areas if specified on the Contract Drawing or as otherwise directed by the Specifier.
- E. Clean all dust from surface and pores of the substrate, using clean water and a scrub brush.
- F. For very dry or porous surfaces, pre-wet the substrate ahead of time to prevent the substrate from drawing moisture out of the repair too quickly. Re-wet the surface immediately before applying the repair material.

3.5 ABANDONED ANCHOR REMOVAL

- A. Remove abandoned anchors, brackets, wood nailers, and other extraneous items indicated to be removed.
 - 1. Remove items carefully to avoid spalling or cracking stone.
 - 2. Notify Architect before proceeding if an item cannot be removed without damaging surrounding stone. Do the following where directed:
 - a. Cut or grind off item approximately 3/4 inch (20 mm) beneath surface and core drill a recess of same depth in surrounding stone as close around item as practical.
 - b. Immediately paint exposed end of item with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended dry film thickness per coat. Keep paint off sides of recess.
 - 3. Plug and patch hole where each item was removed unless directed to remove and replace stone unit.

3.6 STONE REMOVAL AND REPLACEMENT

- A. At locations indicated, remove stone that has deteriorated or is damaged beyond repair or is to be reused. Carefully remove entire units from joint to joint, without damaging surrounding stone, in a manner that permits replacement with full-size units.
- B. Support and protect remaining stonework that surrounds removal area.
- C. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition. Coordinate with new flashing, reinforcement, and lintels, which are specified in other Sections.
- D. Notify Architect of unforeseen detrimental conditions including voids, cracks, bulges, and loose units in existing stone or unit masonry backup, rotted wood, rusted metal, and other deteriorated items.
- E. Remove in an undamaged condition as many whole stone units as possible.
 - 1. Remove mortar, loose particles, and soil from stone by cleaning with hand chisels, brushes, and water.
 - 2. Remove sealants by cutting close to stone with utility knife and cleaning with solvents.
 - 3. Store stone for reuse. Store off ground, on skids, and protected from weather.
 - 4. Deliver cleaned stone not required for reuse to Owner unless otherwise indicated.
- F. Clean stone surrounding removal areas by removing mortar, dust, and loose particles in preparation for stone replacement.
- G. Replace removed damaged stone with other removed stone in good condition, where possible, [or with new stone] matching existing stone, including direction of rift or natural bedding planes. Do not use broken units unless they can be cut to usable size.
- H. Install replacement stone into bonding and coursing pattern of existing stone. If cutting is required, use a motor-driven saw designed to cut stone with clean, sharp, unchipped edges. Finish edges to blend with appearance of edges of existing stone.
 - 1. Maintain joint width for replacement stone to match existing joints.
 - 2. Use setting buttons or shims to set stone accurately spaced with uniform joints.
- I. Set replacement stone with rebuilding (setting) mortar and with completely filled bed, head, and collar joints. Butter vertical joints for full width before setting, and set units in full bed of mortar unless otherwise indicated. Replace existing anchors with new anchors **matching existing configuration**.
 - 1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing stonework.
 - 2. Rake out mortar used for laying stone before mortar sets and point at same time as repointing of surrounding area.

3. When mortar is hard enough to support units, remove shims and other devices interfering with pointing of joints.
- J. Curing: Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.
1. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

3.7 PAINTING STEEL UNCOVERED DURING THE WORK

- A. Notify Architect if steel is exposed during stone removal. Where Architect determines that steel is structural, or for other reasons cannot be totally removed, prepare and paint it as follows:
1. Surface Preparation: Remove paint, rust, and other contaminants according to SSPC-SP 2, "Hand Tool Cleaning", as applicable to comply with paint manufacturer's recommended preparation.
 2. Antirust Coating: Immediately paint exposed steel with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended rate of application (dry film thickness per coat).
- B. If on inspection and rust removal, the thickness of a steel member is found to be reduced from rust by more than 1/16 inch (1.6 mm), notify Architect before proceeding.

3.8 PARTIAL STONE REPLACEMENT

- A. Remove defective portion of existing stone unit (backing stone). Carefully remove defective portion of stone by making vertical and horizontal saw cuts at face of backing stone and removing defective material to depth required for fitting partial replacement (dutchman).
1. Make edges of backing stone at cuts smooth and square to each other and to finished surface; essentially rectangular. Make back of removal area flat and parallel to stone face.
 2. Do not overcut at corners and intersections. Hand trim to produce clean sharp corners with no rounding and no damage to existing work to remain.
 3. If backing stone becomes further damaged, remove damaged area and enlarge partial replacement as required.
- B. Remove mortar from joints that abut area of stone removal to same depth as stone was removed. Remove loose mortar particles and other debris from surfaces to be bonded and surfaces of adjacent stone units that will receive mortar by cleaning with stiff-fiber brush.
- C. Cut and trim partial replacement to accurately fit area where material was removed from backing stone. Fabricate to size required to produce joints between partial replacement and backing stone of no more than 1/16 inch (1.6 mm) in width, and to produce joints between partial replacement and other stones that match existing joints between stones. Cut partial replacement so that, when it is set in final position, natural bedding planes will match the orientation of bedding planes of the backing stone unless otherwise indicated.
- D. Concealed Pinning: Before applying adhesive, prepare for concealed mechanical anchorage consisting of 1/4-inch- (6-mm-) diameter, stainless-steel pins set into 1/4-inch- (6-mm-) diameter holes drilled into backing stone and into, but not through, the partial replacement. Center and space pins 3 to 5 inches (75 to 125 mm) apart and at least 2 inches (50 mm) from any edge. Insert pins at least 2 inches (50 mm) into backing stone and 2 inches (50 mm) into partial replacement, but no **closer than 3/4 inch (19 mm) from exposed face of partial replacement.**
- E. Apply stone-to-stone adhesive according to adhesive manufacturer's written instructions. Coat bonding surfaces of backing stone and partial replacement, completely filling all crevices and voids.
- F. Apply partial replacement while adhesive is still tacky and hold securely in place until adhesive has cured. Use temporary shims, clamps, wedges, or other devices as necessary to align face of partial replacement with face of backing stone.
- G. Clean adhesive residue from exposed surfaces and patch chipped areas[and exposed drill holes] as specified in "Stone Patching" Article.

3.9 STONE PLUG REPAIR

- A. Remove cylindrical piece of damaged stone by core-drilling perpendicular to stone surface.
- B. Prepare a replacement plug by core-drilling replacement stone. Use a drill sized to produce a core that will fit into hole drilled in damaged stone with only minimum gap necessary for adhesive. Cut and install plug so that, when it is set in final position, natural bedding planes will match the orientation of bedding planes of the backing stone unless otherwise indicated.
- C. Apply stone-to-stone adhesive according to adhesive manufacturer's written instructions. Coat bonding surfaces of existing stone and plug, completely filling all crevices and voids.
- D. Apply plug while adhesive is still tacky and hold securely in place until adhesive has cured.
- E. Clean adhesive residue from exposed surfaces.

3.10 STONE-FRAGMENT REPAIR

- A. Carefully remove cracked or fallen stone fragment indicated to be repaired. Reuse only stone fragment that is in sound condition.
- B. Remove soil, loose particles, mortar, and other debris or foreign material from fragment surfaces to be bonded and from parent stone where fragment had broken off, by cleaning with stiff-fiber brush.
- C. Concealed Pinning: Before applying adhesive, prepare for concealed mechanical anchorage consisting of 1/4-inch- (6-mm-) diameter, stainless-steel pins set into 1/4-inch- (6-mm-) diameter holes drilled into parent stone and into, but not through, the fragment. Center and space pins between 3 and 5 inches (75 and 125 mm) apart and at least 2 inches (50 mm) from any edge. Insert pins at least 2 inches (50 mm) into parent stone and 2 inches (50 mm) into fragment, but no closer than 3/4 inch (19 mm) from exposed face of fragment.
- D. Apply stone-to-stone adhesive according to adhesive manufacturer's written instructions. Coat bonding surfaces of fragment and parent stone, completely filling all crevices and voids.
- E. Fit stone fragment onto parent stone while adhesive is still tacky and hold fragment securely in place until adhesive has cured. Use shims, clamps, wedges, or other devices as necessary to align face of fragment with face of parent stone.
- F. Clean adhesive residue from exposed surfaces and patch chipped areas[and exposed drill holes] as specified in "Stone Patching" Article.

3.11 CRACK INJECTION

- A. General: Comply with cementitious crack-filler manufacturer's written instructions.
- B. Drill 1/4-inch- (6-mm) diameter injection holes as follows:
 - 1. Transverse Cracks Less Than 3/8 inch (9 mm) Wide: Drill holes through center of crack at 12 to 18 inches (300 to 500 mm) o.c.
 - 2. Transverse Cracks More Than 3/8 inch (9 mm) Wide: Drill holes through center of crack at 18 to 36 inches (500 to 900 mm) o.c.
 - 3. Delaminations: Drill holes at approximately 18 inches (500 mm) o.c. both vertically and horizontally.
 - 4. Drill holes 2 inches (50 mm) deep.
- C. Clean out drill holes and cracks with compressed air and water. Remove dirt and organic matter, loose material, sealants, and failed crack repair materials.
- D. Place plastic injection ports in drilled holes and seal face of cracks between injection ports with clay or other nonstaining, removable plugging material. Leave openings at upper ends of cracks for air release.
- E. Inject cementitious crack filler through ports sequentially, beginning at one end of area and working to opposite end; where possible, begin at lower end of injection area and work upward. Inject filler until it extrudes from

adjacent ports. After port has been injected, plug with clay or other suitable material and begin injecting filler at adjacent port, repeating process until all ports have been injected.

- F. Clean cementitious crack filler from face of stone before it sets by scrubbing with water.
- G. After cementitious crack filler has set, remove injection ports, plugging material, and excess filler. Patch injection holes and surface of cracks as specified in "Stone Patching" Article.

3.12 STONE PATCHING

- A. Patch the following stone units unless another type of repair or replacement is indicated:
 - 1. Units indicated to be patched.
 - 2. Units with holes.
 - 3. Units with chipped edges or corners. Patch chipped edges or corners measuring more than 3/4 inch (19 mm) in least dimension.
 - 4. Units with small areas of deep deterioration. Patch deep deteriorations measuring more than 3/4 inch (19 mm) in least dimension and more than 1/4 inch (6 mm) deep.
- B. Remove and replace existing patches where indicated unless otherwise indicated or approved by Architect.
- C. Remove deteriorated material and remove adjacent material that has begun to deteriorate. Carefully remove additional material so patch does not have feathered edges but has square or slightly undercut edges on area to be patched and is at least 1/4 inch (6 mm) thick, but not less than recommended in writing by patching compound manufacturer.
- D. Mask adjacent mortar joint or rake out for repointing if patch extends to edge of stone unit.
- E. Mix patching compound in individual batches to match each stone unit being patched. Combine one or more colors of patching compound, as needed, to produce exact match.
- F. Brush-coat stone surfaces with slurry coat of patching compound according to manufacturer's written instructions.
- G. Place patching compound in layers as recommended in writing by patching compound manufacturer, but not less than 1/4 inch (6 mm) or more than 2 inches (50 mm) thick. Roughen surface of each layer to provide a key for next layer.
 - 1. Simple Details: Trowel, scrape, or carve surface of patch to match texture and surrounding surface plane or contour of the stone. Shape and finish surface before or after curing, as determined by testing, to best match existing stone.
 - 2. Carved Details: Build patch up 1/4 inch (6 mm) above surrounding stone, and carve surface to match adjoining stone after patching compound has hardened.
- H. Keep each layer damp for 72 hours or until patching compound has set.
- I. Remove and replace patches with hairline cracks or that show separation from stone at edges, and those that do not match adjoining stone in color or texture.

3.13 FINAL CLEANING

- A. After mortar has fully hardened, thoroughly clean exposed stone surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water, applied by low-pressure spray.
 - 1. Do not use metal scrapers or brushes.
 - 2. Do not use acidic or alkaline cleaners.
- B. Clean adjacent nonstone surfaces. Use detergent and soft brushes or cloths.
- C. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.
- D. Remove masking materials, leaving no residues that could trap dirt.

3.14 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections. Allow inspectors use of lift devices and scaffolding, as needed, to perform inspections.
- B. Architect's Project Representatives: Architect will assign Project representatives to help carry out Architect's responsibilities at the site, including observing progress and quality of portion of the Work completed. Allow Architect's Project representatives use of lift devices and scaffolding, as needed, to observe progress and quality of portion of the Work completed.
- C. Notify inspectors and Architect's Project representatives in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until inspectors and Architect's Project representatives have had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.

3.15 STONE WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess stone materials are Contractor's property.
- B. Stone Waste: Remove stone waste and legally dispose of off Owner's property.

END OF SECTION 040140

This page intentionally left blank

SECTION 042000 - UNIT MASONRY

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Clay face brick (042000.A12).
2. Mortar (042000.A19)
3. Mortar - colored (042000.A21).
4. Grout (042000.A22).
5. Reinforcement
 - a. Steel reinforcing bars (042000.A23).
 - b. Masonry-joint reinforcement (042000.A24).
 - c. Ties and anchors.
 - d. Adjustable Masonry Veneer Anchors (042000.A26).
 - e. Rigid Anchors (042000.A27).
6. Masonry flashing materials:
 - a. Embedded Metal Flashing (042000.A30).
 - b. Drip Edge (042000.A31).
 - c. Embedded flexible through-wall flashing (042000.A32).
 - d. Single wythe CMU flashing system (042000.A33).
 - e. Termination Bars (042000.A34).
 - f. Isolation strip flashing (042000.A42).
7. Miscellaneous masonry accessories.
 - a. Compressible filler (042000.A35).
 - b. Tubular compressible filler (042000.A36).
 - c. Wicking Material/Rope Weeps (042000.A38).
 - d. Weep Vents (042000.A39).
 - e. Cavity drainage material (042000.A40).
 - f. Cavity wall insulation (042000.A45).
 - g. Brick Expansion joint (042000.A47)
8. Foamed-in-place masonry-cell fill insulation (042000.A44).

B. Products Installed but not Furnished under This Section:

1. Cavity wall insulation.

C. Related Requirements:

1. Section 012200 "Unit Prices" for unit prices relating to work of this Section
2. Section 012300 "Alternates" for alternates effecting work of this Section.
3. Section 014000 "Quality Requirements" for independent testing agency procedures and administrative requirements.
4. Section 024119 "Selective Demolition" for salvaged brick.
5. Section 042200 "Concrete Unit Masonry" for concrete masonry units.
6. Section 047200 "Cast Stone Masonry" for furnishing cast stone trim.
7. Section 051200 "Structural Steel Framing" for installing anchor sections of adjustable masonry anchors for connecting to structural steel frame.
8. Section 055000 "Metal Fabrications" for furnishing steel lintels and shelf angles for unit masonry.
9. Section 071326 "Self Adhered Waterproofing" for additional moisture barrier product and installation requirements.
10. Section 071900 "Water Repellents and Sealers" for water repellent products applied to the unit masonry.
11. Section 072100 "Thermal Insulation" for cavity wall insulation.
12. Section 072726 "Fluid-Applied Air Barrier Coating" for air barrier and transition membrane.
13. Section 076200 "Sheet Metal Flashing and Trim" for exposed sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.

1.2 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Before installation of unit masonry, review procedures and tolerances for ensuring quality of masonry materials. Require representatives of each entity directly concerned with unit masonry to attend, including but not limited to the following:
 - a. Owner's representative
 - b. Architect and Engineer.
 - c. Contractor's superintendent.
 - d. Masonry subcontractor.
 - e. Manufacturer's representative for masonry units.
 - f. Manufacturer's representative for flashing components.
 - g. Manufacturer's representative for moisture barrier system.
 - h. Manufacturer's representative for fluid applied air barrier system.
 - 2. Review field quality control measures for the following items:
 - a. Field dimensions and tolerances for unit masonry installation.
 - b. Installation procedures for flashing components.
 - c. Review of shop drawing elevations indicating colors of unit masonry and locations.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Submit product data for cavity wall insulation concurrently with product data for cavity wall insulation air barrier coatings.
- B. Shop Drawings: For the following:
 - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 - 2. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
- C. Samples for Initial Selection:
 - 1. Clay face brick, in the form of straps of five or more bricks.
 - 2. Weep holes and cavity vents.
- D. Samples for Verification: For each type and color of the following:
 - 1. Clay face brick, in the form of straps of five or more bricks.
 - 2. Special shapes for the following:
 - a. Clay face brick.
 - 3. Pigmented and colored-aggregate mortar. Make Samples using same sand and mortar ingredients to be used on Project.
 - 4. Adjustable veneer anchors.
 - 5. Flexible through wall flashing.
 - 6. Weep holes and cavity vents.
 - 7. Accessories embedded in masonry.

1.5 INFORMATIONAL SUBMITTALS

- A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.
- B. Qualification Data: For testing agency.
- C. Installer Qualifications for Foamed-in-Place Masonry Cell Fill Insulation: Engage an experienced dealer/applicator who has been trained and licensed by the product manufacturer and which has not less than three years direct experience in the installation of the product used.
- D. Material Certificates: For each type and size of the following:
1. Masonry units.
 - a. Include material test reports substantiating compliance with requirements.
 - b. For exposed brick, include test report for efflorescence according to ASTM C 67, including testing for Initial Rate of Absorption (IRA).
 2. Cementitious materials. Include name of manufacturer, brand name, and type.
 3. Mortar admixtures.
 4. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
 5. Grout mixes. Include description of type and proportions of ingredients.
 6. Reinforcing bars.
 7. Joint reinforcement.
 8. Anchors, ties, and metal accessories.
 9. Flexible flashing: Include independent testing to verify the 8 mil and 32 mil requirements.
- E. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.
- F. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.
- G. Grout Procedures: Detailed description of methods, materials, and equipment to be used to comply with grouting requirements.
- H. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.
- B. In-Place Mockups: Build mockups to verify selections made under sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
1. Build in-place mockups for typical exterior wall area indicated on Drawings. Mockup shall be built to dimensions as indicated on Drawings and shall include the following features.
 - a. In approximately the center of each leg of mockup shall be a 3/8 inch wide sealant-filled control joint. All backup substrates shall receive fluid-applied air barrier coating.
 - b. Include fixed aluminum window openings in dimensions and locations indicated on Drawings. Include window glazing and all accessories. Seal perimeter of window at head, sill and one jamb, leaving one jamb open for observation.
 - c. Include through-wall flashing installed for full length of all legs of mockup.
 - d. Include air barrier coating, cavity insulation, veneer anchors, flashing, cavity drainage material, and weep holes and rope weeps (as applicable) in exterior masonry-veneer wall mockup.
 2. Clean one-half of exposed faces of mockups with masonry cleaner as indicated.
 3. Protect accepted mockups from the elements with weather-resistant membrane.
 4. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.

- a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
 - b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.
- 5. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- C. Mockups for Interior Walls: Build mockups to verify selections made under sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Build mockups for typical interior wall areas indicated on Drawings.
 - 2. Protect accepted mockups from the elements with weather-resistant membrane.
 - 3. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.
 - a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
 - b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.
 - 4. Subject to compliance with requirements, approved field sample(s) may become part of the completed Work.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.
- C. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.8 FIELD CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 402/602-16.
 - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 402/602-16.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- B. Source Limitations for Face Brick: Obtain exposed face brick of a uniform texture, color and size, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
 - 1. Provide Thin Brick from same source as Face Brick.
- C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 PERFORMANCE REQUIREMENTS

- A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.
 - 1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 402/602-16.

2.3 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 402/602-16, except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.
- C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated as determined by testing according to ASTM E119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.
 - 1. Where fire-resistance-rated construction is indicated, units shall be listed by a qualified testing agency acceptable to authorities having jurisdiction. Documentation of listing and sourcing shall be provided by manufacturer to Owner and Architect.

2.4 BRICK

- A. Regional Materials: Brick shall be manufactured within 500 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.
- B. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:
 - 1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
 - 2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
 - 3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
 - 4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
- C. Face Brick (042000.A12): Facing brick complying with ASTM C 216.

1. Basis-of-Design - **Type UM1** : Provide Bowerston Shale Company face brick in types and patterns as indicated on drawings.
 2. Basis-of-Design - **Type UM2** : Provide Belden Brick Company "Garden Blend Matte" face brick.
 3. Grade: SW.
 4. Type: FBX.
 5. Brick Texture: Match Existing.
 6. Size/Pattern: Modular Running Bond to match existing pattern.
 7. Unit Compressive Strength: Provide units with minimum average net-area compressive strength as follows:
 - a. Match existing compressive strength of existing installed adjacent brick as determined by Architect and Contractor, verified by manufacturer and Contractor's field-testing data.
 8. Initial Rate of Absorption:
 - a. Less than 30 g/30 sq. in. per minute when tested according to ASTM C 67.
 - b. Match existing initial rate of absorption of existing installed adjacent brick as determined by Architect and Contractor, verified by manufacturer and Contractor's field-testing data.
 9. Saturation Coefficient: Provide units with the maximum
 - a. Match existing saturation coefficient of existing installed adjacent brick as determined by Architect and Contractor, verified by manufacturer and Contractor's field-testing data.
 10. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
 11. Size (Actual Dimensions):
 - a. Match existing brick at project site as determined by Architect and Owner.
 12. Application: Use where brick is exposed unless otherwise indicated.
 13. Color and Texture: Match Architect's samples.
 - a. Match existing brick at project site as determined by Architect and Owner.
- D. Salvaged Brick:
1. General: Salvage and clean brick from deconstructed areas to provide replacement units.
 2. Salvaged Units:
 - a. Clean units removed during selective demolition areas.
 - b. Clean off residual mortar.
 3. Priorities:
 - a. Address repairs near entrances.
 - b. Address repairs below low roofs.

2.5 STONE TRIM UNITS

- A. Limestone: ASTM C 568/C 568M, Classification II Medium or Classification III High Density.
1. Basis of Design: US Stone; "Flint Hills Gray - Textured Honed (Smooth)" or a comparable product submitted to and accepted by Architect and Owner prior to bidding.

2.6 MORTAR (042000.A19) AND GROUT (042000.A22) MATERIALS

- A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C 114.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Aggregate for Mortar: ASTM C 144.
1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- E. Aggregate for Grout: ASTM C 404.
- F. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

- G. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent from same manufacturer.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. ACM Chemistries; RainBloc for Mortar
 - b. BASF Aktiengesellschaft; Rheopel Mortar Admixture.
 - c. Grace Construction Products, W. R. Grace & Co. – Conn; Dry-Block Mortar Admixture
- H. Water: Clean, Potable.

2.7 REINFORCEMENT

- A. Uncoated-Steel Reinforcing Bars (042000.A23): ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.
- B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
- C. Masonry-Joint Reinforcement, General (042000.A24): ASTM A 951/A 951M.
 - 1. Interior Walls: Hot-dip galvanized carbon steel, Class B-2.
 - 2. Exterior Walls: Hot-dip galvanized carbon steel, Class B-2.
 - 3. Wire Size for Side Rods: 0.148-inch diameter.
 - 4. Wire Size for Cross Rods: 0.148-inch diameter.
 - 5. Wire Size for Veneer Ties: 0.148-inch diameter.
 - 6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
 - 7. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.
- D. Masonry-Joint Reinforcement for Single-Wythe Masonry: Ladder or truss type with single pair of side rods.
- E. Masonry-Joint Reinforcement for Multiwythe Masonry:
 - 1. Adjustable (two-piece) type, ladder design, with one side rod at each face shell of backing wythe and with separate adjustable ties with pintle-and-eye connections having a maximum horizontal play of 1/16 inch and maximum vertical adjustment of 1-1/4 inches. Size ties to extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face.
 - a. At Contractor's option, masonry joint reinforcement for single-wythe masonry may be used in backup wythe in conjunction with individual adjustable masonry veneer anchors for exterior wythe.

2.8 TIES AND ANCHORS

- A. General: Ties and anchors shall extend at least 1-1/2 inches into veneer but with at least a 5/8-inch cover on outside face.
- B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
 - 1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M, with ASTM A 153/A 153M, Class B-2 coating.
 - 2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
 - 3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
 - 1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch-diameter, hot-dip galvanized steel wire.
 - 2. Tie Section: Triangular-shaped wire tie made from 0.25-inch-diameter, hot-dip galvanized steel wire, Class B-2.
- D. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
 - 1. Use adjustable masonry veneer anchors specified later in this Section.
- E. Partition Top Anchors: 0.105-inch-thick metal plate with a 3/8-inch-diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from

steel, hot-dip galvanized after fabrication.

- F. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins unless otherwise indicated.
1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.
- G. Adjustable Masonry-Veneer Anchors (042000.A26):
1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to metal studs, and as follows:
 - a. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.
 2. Provide anchors designed for attachment over sheathing to metal studs and other substrates indicated.
 3. Fabricate sheet metal anchor sections and other sheet metal parts from 0.075-inch-thick steel sheet, galvanized after fabrication.
 4. Wire Ties: Fabricate ties from 0.187-inch- diameter, hot-dip galvanized-steel wire unless otherwise indicated.
 - a. Wire ties shall be triangular- or rectangular-shaped.
 5. Masonry-Veneer Anchors - Contractor's Option: Unless otherwise indicated, provide one of the adjustable masonry-veneer anchors specified.
 - a. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie, a metal anchor section and insulation support plate. Provide one of the following anchor sections for masonry backup and metal stud with sheathing:
 - 1) Provide "CTP-16" adjustable masonry veneer anchors with insulation support plate as manufactured by Construction Tie Products, Inc.
 - 2) Provide "Slotted Rap-Tie" masonry veneer anchors with insulation support plate as manufactured by FERRO Corporation.
 - b. Fabricate sheet metal anchors sections and other sheet metal parts from 0.075 inch thick, steel sheet, galvanized after fabrication.
 6. At Interior, CMU Veneer Anchored to Steel Studs: Subject to compliance with requirements, provide "DW-10" by Hohmann & Barnard or a comparable product submitted to and accepted by Architect.
 7. At Stack Bond Pattern for Masonry Veneer: Single screw anchor designed to penetrate and seal and secure insulation to backup, with 3/16 dia. hot-dip galvanized or stainless steel adjustable swaged, overlapping wire legs designed to engage a single continuous horizontal wire reinforcement. Anchor shall include stainless steel barrel with coated carbon steel screw. Barrel length shall match insulation length. Provide the following or a comparable product acceptable to Architect.
 - a. Basis-of-Design Product: "Thermal 2-Seal Tie" and "Thermal Concrete 2-Seal" as manufactured by Hohmann & Barnard, Inc.
 8. At Stone Cornice: Provide stainless steel stone anchors from Wire-Bond or another acceptable manufacturer.
 - a. Basis of Design Products: Wire-Bond; 3063 "L Anchor", 3059 "Z Anchor" and 3055 "Split Tail Anchor".
 - b. Material thickness shall be 3/16 inch.
 9. Polymer-Coated, Steel Drill Screws for Steel Studs: ASTM C 954 except manufactured with hex washer head and neoprene or EPDM washer, No. 10 diameter by length required to penetrate steel stud flange with not less than three exposed threads, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours according to ASTM B 117.
 10. Steel Tapping Screws for Concrete and Masonry: Self-tapping screws tapcon with specially designed threads for tapping and wedging into masonry, with hex washer head and neoprene washer, 3/16" diameter by 1-1/2" length, and with the following corrosion-protective coating:
 - a. Organic polymer coating with salt-spray resistance to red rust of more than 500 hours per ASTM B 117.

2.9 MISCELLANEOUS ANCHORS

- A. Unit Type Inserts in Concrete: Cast-iron or malleable-iron wedge-type inserts.
- B. Anchor Bolts: L-shaped steel bolts complying with ASTM A307, Grade A (ASTM 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.
- C. Post installed Anchors: Torque-controlled expansion anchors or chemical anchors.
1. Load Capacity: 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.

2. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F1941 (ASTM F1941M), Class Fe/Zn 5 unless otherwise indicated.
 3. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F738M) and nuts, ASTM F594 (ASTM F836M).
- D. Stainless Steel Dowels: ASTM A 276 or ASTM A666, Type 304, 1/2 inch diameter and not less than 5 inches long to provide at least 2 inch embedment in to adjoining units/substrates.

2.10 EMBEDDED FLASHING MATERIALS

- A. Embedded Metal Flashing (042000.A30):
1. Stainless Steel: ASTM A 240/A 240M, Type 304:
 - a. 26 gage for backing plate at butt laps.
 - b. 22 gage for receiver flashing and metal sealant stop.
 2. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet.
 3. Adhesive to adhere stainless steel flashing to top of lintel or substrate.
 4. Silicone sealant between stainless steel flashing at butt-laps.
- B. Flexible Flashing (042000.A32):
1. Rubberized Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive.
 - a. Composite Sheet: Flashing shall be 40 mils in nominal thickness, consisting of 32 mil self-adhering rubberized asphalt membrane laminated to an 8 mil, cross-laminated and high-density polyethylene film.
 - b. Basis-of-Design Product: Subject to compliance with requirements, provide one of the products listed below or comparable product from other manufacturers, meeting specified requirements, submitted to and accepted by Architect prior to bidding.
 - 1) Acceptable Manufacturers and Products:
 - (a) Carlisle Coatings and Waterproofing; CCW-705-TWF.
 - (b) Henry; Blueskin TWF.
 - (c) Firestone Building Products; Enverge Flashgard.
 - (d) Grace Construction; Perm-A-Barrier Wall Flashing.
 - 2) Fire Propagation Characteristics: Flexible strip flashing is used in exterior walls.
 - 3) Flexible flashing shall pass NFPA 285 testing as part of an approved assembly. Flashing shall be compatible with air barrier coating specified in Section 072729.
 - c. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.
- C. Application: Unless otherwise indicated, use the following:
1. For through-wall flashing, use flexible flashing to exterior face of exterior wythe, adhere flexible flashing to top of metal drip edge. Adhere stainless steel drip edges to masonry, steel lintels and adjacent construction beneath drip edge as occurs.
- D. Single-Wythe CMU Flashing System (042000.A33): System of CMU cell flashing pans and interlocking CMU web covers made from UV-resistant, high-density polyethylene incorporating chemical stabilizers that prevent UV degradation. Cell flashing pans have integral weep spouts designed to be built into mortar bed joints and weep collected moisture to the exterior of CMU walls and that extend into the cell to prevent clogging with mortar.
1. Products: Subject to compliance with requirements, provide the following or comparable product submitted to and accepted by Architect prior to bidding:
 - a. Mortar Net USA, Ltd; Blok-Flash.
- E. Accessories for Flexible Flashing:
1. Drip Edges (042000.A31): Provide stainless steel drip edges fabricated from ASTM A 240/A 240M, Type 304, not less than 0.016 inch thick. Fabricate drip edges with a 2-1/2 inch minimum flange and a 3/8 inch drip. All exposed corners shall be welded, and the edge rounded. Mitering of outside corners will not be accepted.
 - a. Termination Drip Edges at Steel Lintels and Shelf Angles: Provide stainless steel drip edges fabricated to configuration indicated from ASTM A 240/A 240M, Type 304, not less than 0.016 inch thick. Stainless steel flashing shall be performed to wrap around exposed portion of steel lintels and shelf angles and provide a drip edge.
 2. Termination Bars (042000.A34): Provide stainless steel or aluminum bars; 1/8 inch thick with a 1 inch face and 1/4 inch minimum bent top (lip) to receive sealant and 8'-0" to 10'-0" length. Bars shall be predrilled at 8 inch centers starting 4 inch from each end.
 - a. Termination bars shall be similar to Wire-Bond, Model 4210.

3. Adhesives: Provide adhesives as recommended by flexible flashing manufacturer for adhering flexible flashing to drip edge and adhering drip edge to supporting substrate.
- F. Solder and Sealants for Sheet Metal Flashings:
1. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
 2. Elastomeric Sealant: ASTM C 920, chemically curing urethane or polysulfide sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and remain watertight.
- G. 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.
- H. Moisture Barrier:
1. Refer to Section 071326 "Self-Adhered Sheet Waterproofing" for additional moisture barrier system product and installation requirements.

2.11 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler (042000.A35): Premolded filler strips, compressible up to 50 percent; of width and thickness indicated; formulated from neoprene or urethane.
1. Synthetic Foam complying with ASTM D 5249, Type 2; of width and thickness indicated.
 - a. Basis of Design Product: W.R. Meadows; "Ceramair".
 2. Neoprene complying with ASTM D 1056, Grade 2A1; of width and thickness indicated.
 - a. Basis of Design Product: Hohmann & Barnard, "NS Closed Cell Neoprene Sponge".
 3. Thickness:
 - a. Joints 3/8 inch.
 - b. Expansion Joints: 1/2 inch.
 4. Width:
 - a. Expansion joints above base flashing: 3 inches, held back 1 inch.
 - b. Expansion joints below base flashing: 6 inches, held back 1 inch.
 - c. Joints: 4 inches, unless otherwise indicated.
- B. Tubular Compressible Fillers (042000.A36): Pre-molded, neoprene, butyl, EPDM or silicone tubing complying with ASTM D1056, non-absorbent to water and gas, capable of remaining resilient at temperatures down to 26 deg. F. Provide products with low compression set and of shapes and sizes as follows:
1. Outside diameter shall be 1/4 inch greater than air cavity between face brick and backup construction.
 2. Basis of Design Product: Subject to compliance with requirements, provide "Insul-Tube" by Namoco K-Flex.
- C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).
- D. Weep/Cavity Vent Products: Use **[one of]** the following unless otherwise indicated:
1. Mesh Weep/Vent (042000.A39): Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch less than depth of outer wythe; in color selected from manufacturer's standard.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Mortar Net USA, Ltd.; Mortar Net Weep Vents.
 - 2) CavClear/Archovations, Inc.: CavClear Weep Vents.
 - 3) Hohmann & Barnard, Inc.: Mortar Trap Weep Vents.
 - b. Size: Weep shall be sized for full vertical dimension of masonry units indicated.
- E. Cavity Drainage Material (042000.A40): Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
1. Products: Subject to compliance with requirements, provide the following:
 - a. Mortar Net USA, Ltd.; "Wall Defender".
 - b. Mortar Net Solutions; "MortarNet with Insect Barrier".
 - c. Comparable products from other manufacturers submitted to and accepted by Architect prior to bidding will be considered.
 2. Thickness: 2 inches.
 3. Configuration: Provide the following:
 - a. Strips, full depth of cavity and 10 inches high, with dovetail-shaped notches 7 inches deep that prevent clogging with mortar droppings.

- F. Isolation Strip Flashing (042000.A42): Provide self-adhering, polyethylene-sheet backed rubberized asphalt membrane, 40 mils thick.
1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work included, but are not limited to, the following:
 - a. Air-Shield by W. R. Meadows, Inc.
 - b. Blueskin by Henry Corp.
 - c. CCW 705 by Carlisle Coatings & Waterproofing.
 - d. Hyload S/A Through Wall Flashing by Hyload, Inc.

2.12 FOAMED-IN-PLACE MASONRY CELL FILL INSULATION (042000.A44)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide "Core-Fill 500" as manufactured by Tailored Chemical Products, Inc. Comparable products from other manufacturers, meeting specified requirements, will be considered when submitted to and accepted by Architect.
1. General Description: Cell fill insulation shall be a two-component thermal insulation produced by combining a plastic resin and catalyst foaming agent surfactant which, when properly ratioed and mixed, together with compressed air produce a cold-setting foam insulation in the hollow cores of hollow unit masonry walls.
 2. Product Characteristics:
 - a. Thermal Values: "R" Value of 4.91/inch @ 32 degrees F mean; ASTM C-177.
 - b. Sound Abatement: Minimum Sound Transmission Class ("STC") rating of 53 and a minimum Outdoor Indoor Transmission Class ("OITC") rating of 44 for 8" wall assembly (ASTM E 90-90).
- B. Fire Performance Characteristics: Provide insulation materials which are identical to those whose fire performance characteristics, as listed for each material or assembly of which insulation is a part, have been determined by testing, per methods indicated below, by a testing agency acceptable to authorities having jurisdiction.
1. Surface Burning Characteristics: Maximum flame spread, smoke developed, and fuel contributed of 0, 5 and 0 respectively when tested in accordance with ASTM E 84.
 2. Combustion Characteristics: Must be noncombustible, Class A building material.

2.13 CAVITY-WALL INSULATION (042000.A45)

- A. Polyisocyanurate Board Insulation: Refer to Section 072100 for requirements.
1. Provide behind steel lintels prior to installation of through-wall flashing and at other locations where indicated. Shape to configurations shown.
- B. General: Refer to Section 072100 for miscellaneous rigid insulation installed under this Section.
1. Application: Refer to details for application of rigid insulation:
 - a. Below base flashing (through wall flashing).
 - 1) Provide extruded polystyrene (XPS) insulation (072100.A01).
 - 2) Thickness: 2 inches.
 - b. Above base flashing (through wall flashing).
 - 1) Provide polyisocyanurate insulation (072100.A04).
 - 2) Thickness: 3 inches.

2.14 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned. Do not use acidic cleaners on manufactured stone masonry.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Diedrich Technologies, Inc.
 - b. EaCo Chem, Inc.
 - c. ProSoCo, Inc.

2.15 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
 - 2. Use portland cement-lime mortar unless otherwise indicated.
 - 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.
 - 1. For masonry below grade or in contact with earth, use Type S.
 - 2. For reinforced masonry, use Type S.
 - 3. For exterior, above-grade, loadbearing and non-load-bearing walls and parapet walls, use Type S.
 - 4. For interior load-bearing walls, use Type S.
 - 5. For interior non load-bearing partitions, use Type N.
 - 6. For exterior masonry veneer, use Type N.
 - 7. For other applications where another type is not indicated, use Type N.
- D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products].
 - 1. Pigments shall not exceed 10 percent of portland cement by weight.
 - 2. Mix to match Architect's sample.
 - 3. Application: Use pigmented mortar for exposed mortar joints with the following units:
 - a. Clay face brick.
 - b. Stone trim units.
 - c. Cast-stone trim units.
- E. Grout for Unit Masonry: Comply with ASTM C 476.
 - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
 - 2. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 3000 psi.
 - 3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

2.16 MATERIALS FOR CLEANING OF EXISTING MASONRY

- A. General: Cleaning methods are to be tested on field sample mockup areas and are to progress from least harsh (bucket and brush) method to more harsh (chemical cleaning) methods.
- B. Water for Cleaning: Clean, potable, free of oils, acids, alkalis, salts, and organic matter.
- C. Warm Water: Heat water to temperature of 140 deg F-180 deg F (60 deg C-82 deg C).
- D. Brushes: Fiber bristle only.
- E. Brick Cleaner: Manufacturer's alkaline masonry cleaner.
 - 1. Product: Subject to compliance with requirements, provide one of the following:
 - a. Enviro Klean "ReKlaim" cleaner and Sure Klean "Limestone and Masonry Afterwash", both manufactured by ProSoCo, Inc.
 - 1) For mold and mildew removal, provide Enviro Klean "ReVive" by ProSoCo.
 - b. Diedrich Chemicals; comparable product.
- F. Protective Film: For windows, glass, metal, and polished stone surfaces during acidic and alkaline masonry cleaning, use self-adhesive, translucent polyethylene protective film.
 - 1. Products: 3M Long-mask Masking Tape #2090 and the self-adhesive, thin, window protection film by 3M, 3M Protective Tape 2A26B. Catalog No. RM2090, 24" or 35" side.

- G. Spray Equipment: Provide equipment for controlled spray application of water and chemical cleaners, if any, at rates indicated for pressure, measured at spray tip, and for volume.
 - 1. For spray application of chemical cleaners provide low-pressure tank or chemical pump suitable for chemical cleaner indicated, equipped with cone-shaped spray-tip.
 - 2. For spray application of water provide fan-shaped spray-tip which disperses water at angle of not less than 45 degrees.
- H. Chemical Cleaning Solutions:
 - 1. When recommended by chemical cleaner manufacturer, dilute chemical cleaning materials with water to produce solutions of concentration indicated but not greater than that recommended by chemical cleaner manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
 - 2. Verify that foundations are within tolerances specified.
 - 3. Verify that reinforcing dowels are properly placed.
 - 4. Verify that substrates are free of substances that impair mortar bond.
 - 5. Verify that fluid applied air barrier and bellows are complete.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build singlewythe walls to actual widths of masonry units, using units of widths indicated.
- B. Build chases and recesses to accommodate items specified in this and other Sections.
- C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.
- D. 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, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.
- F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.
- G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested according to ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.
- H. Do not lay units containing with surface chips larger than a nickel.
- I. Coordination with Spray-Applied Membrane Air Barrier Coating: Adjustable veneer anchors shall be installed after application of air barrier.
- J. Fluid Applied Air Barrier Requirements: This project will have fluid-applied Air Barrier material applied to the cavity side of the CMU. Special attention and care must be taken to provide a smooth, filled surface to receive the

membrane. The care is necessary to insure the design performance of the selected materials. Concrete masonry unit (CMU) wall shall be prepared as follows to accept the air & vapor barrier:

1. Surfaces shall be free of contaminants such as grease, oil and wax on surfaces to receive membrane.
2. CMU surfaces shall be free from projections.
3. Strike all mortar joints flush to the face of the concrete block.
4. Fill all voids and holes greater than 1/4 inch across at any point with mortar, sealant, or other approved fill material.
5. Surface irregularities exceeding 1/4 inch in height or sharp to touch shall be ground flush or made smooth.
6. Fill around all penetrations with mortar, sealant or other approved fill material and strike flush.
7. Remove mortar droppings on brick ties, shelf angles, brick shelves or other horizontal obstructions.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet or 1/2-inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in bond pattern indicated on Drawings; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
 1. Refer to Exterior Elevations and Exterior Material Legend for bond pattern.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

- D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.
- H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
 - 1. Fill cores in exterior masonry veneer and hollow CMUs with grout or mortar under through-wall flashing.
 - 2. Fill base of wall between exterior masonry veneer and CMUs (collar joint) with grout as indicated and apply mortar across top if insulation and grout to form a mortar wash directly beneath horizontal leg of through-wall flashing.
- I. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
 - 1. Install compressible filler in joint between top of partition and underside of structure above.
 - 2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c. unless otherwise indicated.
 - 3. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078446 "Fire-Resistive Joint Systems."

3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow brick and CMUs as follows:
 - 1. Fully bed face shells in mortar and make head joints of depth equal to bed joints.
 - 2. Fully bed webs in mortar in all courses of piers, columns, and pilasters.
 - 3. Fully bed webs in mortar in grouted masonry, including starting course on footings.
 - 4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
 - 5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.
 - 6. For concrete unit masonry at window infills, provide horizontal joint reinforcement at 16 inches on center vertically starting at 8 inches above bottom of opening. Provide mesh ties secured to sides of existing opening, spaced vertically to match horizontal joint reinforcing.
- B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Set cast stone in full bed of mortar with full vertical joints to comply with requirements indicated. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure cast stone in place. Shim and adjust anchors, supports, and accessories to set cast stone accurately in locations indicated, with uniform joints of widths indicated, and with edges and faces aligned according to established relationships and indicated tolerances.
 - 1. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated.
 - a. Sealing expansion and other joints is specified in Section 079200 "Joint Sealants."
 - 2. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
 - 3. Allow cleaned surfaces to dry before setting.
 - 4. Set cast stone units in pattern as indicated on Drawings.
 - 5. As specified, rake out mortar joints for pointing with sealant.
- D. Covered Joints: Cut joints flush where indicated to receive the following finishes unless otherwise indicated.
 - 1. Strike mortar joints flush in exterior face of CMU walls that receive finishes noted below to provide smooth trowel-cut mortar joints, struck full and flush.
 - a. Fill all voids and holes, particularly in the mortar joints by striking joint flush.
 - b. Mortar joints shall be free of voids exceeding 1/4 inch across.

2. Finishes:
 - a. Waterproofing
 - b. Moisture Barrier.
 - c. Cavity wall insulation
 - d. Fluid applied air barriers.
 - e. Plaster
 - f. Other direct-applied finishes (other than paint).

3.6 CAVITY WALLS

- A. Bond wythes of cavity walls together using one of the following methods:
 1. Where air/moisture barrier is integral with exterior wall sheathing, use adjustable-type (two-piece-type) ties.
 2. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie for 2.0 sq. ft. of wall area spaced not to exceed 16 inches o.c. horizontally and 16 inches o.c. vertically. Provide additional ties within 12 inches of openings and space not more than 36 inches apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches o.c. vertically.
 - a. Use adjustable-type (two-piece-type) ties.
 - b. At base of wall, within 12 inches of horizontal leg of through-wall flashing, provide adjustable veneer anchors. Install in joint indicated and space at 32 inches o.c.
 - c. Install additional anchors within 12 inches of openings, expansion joints, corners, and similar conditions, and at intervals, not exceeding 8 inches, around perimeter.
 - d. Provide additional anchors as needed where tie spacing is not sufficient to maintain 16 inch on center spacing each way.
 - e. Provide additional anchors one course below base flashing to hold veneer wythe below flashing during grouting. Space anchors at 24 inches on center horizontally, maximum.
- B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.

3.7 FOAMED-IN-PLACE MASONRY CELL FILL INSULATION

- A. General: Install foamed-in-place insulation from interior, or as specified, prior to installation of interior finish work and after all masonry and structural concrete work is in place; comply with manufacturer's instructions.
- B. Installation: Fill all open cells and voids in hollow concrete masonry walls where shown on drawings. The foam insulation shall be pressure injected through a series of 5/8" to 7/8" holes drilled into every vertical column of block cells (every 8" on center) beginning at an approximate height of four (4) feet from finished floor level. Repeat this procedure at an approximate height of ten (10) feet above the first horizontal row of holes (or as needed) until the void is completely filled. Patch holes with mortar and score to resemble existing surface.

3.8 CAVITY-WALL INSULATION

- A. Installing Cavity Wall Insulation: Place insulation over veneer anchors and push anchors through insulation and tight against backup. or attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.
 1. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.
 2. Rigid Insulation:
 - a. Below Base Flashing (through wall flashing):
 - 1) Install anchors over moisture barrier.
 - 2) Push rigid insulation over anchors to hold it in place prior to laying veneer.
 - b. Above Base Flashing (through wall flashing):
 - 1) Cut strip to fit size of first course gap above mortar wash.

3.9 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

3.10 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

- A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:
1. Provide an open space not less than 1 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
 2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
 3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.11 SETTING STONE IN MORTAR

- A. Set cast stone as indicated on Drawings. Set units accurately in locations indicated, with edges and faces aligned according to established relationships and indicated tolerances.
1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
 2. Coordinate installation of cast stone with installation of flashing specified in other Sections.
- B. Wet joint surfaces thoroughly before applying mortar or setting in mortar.
- C. Set units in full bed of mortar with full head joints unless otherwise indicated.
1. Set units with joints 1/4 to 3/8 inch wide unless otherwise indicated.
 2. Build anchors and ties into mortar joints as units are set.
 3. Fill dowel holes and anchor slots with mortar.
 4. Fill collar joints solid as units are set.
 5. Build concealed flashing into mortar joints as units are set.
 6. Keep head joints in copings and between other units with exposed horizontal surfaces open to receive sealant.
 7. Keep collar joints open to receive sealant.
 8. Keep joints at shelf angles open to receive sealant.
- D. Tool exposed joints slightly concave when thumbprint hard. Use a smooth plastic jointer larger than joint thickness.
- E. Rake out joints for pointing with sealant to depths of not less than 3/4 inch. Scrub faces of units to remove excess mortar as joints are raked.
- F. Point joints with sealant to comply with applicable requirements in Section 079200 "Joint Sealants."
1. Prime stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.
- G. Provide sealant joints at head joints of copings and other horizontal surfaces; at expansion, control, and pressure-relieving joints; and at locations indicated. Provide sealant to fill open collar joints.
1. Keep joints free of mortar and other rigid materials.
 2. Keep cavities open where unfilled space is indicated between back of cast stone units and backup wall; do not fill cavities with mortar or grout.
 3. Build in compressible foam-plastic joint fillers where indicated.
 4. Form joint of width indicated, but not less than 3/8 inch.

3.12 INSTALLATION TOLERANCES FOR STONE

A. Variation from Plumb: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.

B. Variation from Level: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.

- C. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches or one-fourth of nominal joint width, whichever is less.
- D. Variation in Plane between Adjacent Surfaces (Lipping): Do not vary from flush alignment with adjacent units or adjacent surfaces indicated to be flush with units by more than 1/16 inch, except where variation is due to warpage of units within tolerances specified.

3.13 CONTROL AND EXPANSION JOINTS

- A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry as follows (042000.A46):
 - 1. General:
 - a. Provide continuous 3/8-inch wide vertical joint without full face shell bedding.
 - b. Provide joint relatively free of mortar. Remove mortar as required to allow for sealant joint to be installed.
 - c. Stop reinforcing 2 inches each side of control joint, unless otherwise required.
 - 2. At 4-hour fire-rated walls, fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
 - 3. At 2-hour fire-rated walls, install sash block on each side of joint, install preformed gasket, rake back mortar to allow for installation of backer rod and sealant, or install square-end block on each side of joint, fill head joint between block with ceramic fiber felt, rake back mortar to allow for installation of backer rod and sealant.
 - 4. At non-fire-rated walls, install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.
- C. Form expansion joints in brick as follows (042000.A47):
 - 1. Build in compressible joint fillers where indicated.
 - a. Set compressible filler back 1 inch from face of brick to allow for sealant joint to be installed.
 - b. Below base flashing, install compressible filler across cavity to prevent grout from being continuous behind the joint.
 - 2. Form open joint full depth of brick wythe and of width indicated, but not less than 1/2 inch for installation of compressible filler and, sealant and backer rod specified in Section 079200 "Joint Sealants."
- D. Provide horizontal, pressure-relieving joints (042000.A48) by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 079200 "Joint Sealants," but not less than 3/8 inch.
 - 1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.14 LINTELS

- A. Install steel lintels where indicated.
 - 1. Hold toe of lintel back 1 inch from face of brick
- B. Provide masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.
- C. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.15 FLASHING, WEEP HOLES, CAVITY VENTS AND CAVITY DRAINAGE

- A. General:
 - 1. Install embedded flashing, weep holes and cavity drainage material in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
 - 2. Install cavity vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.
- B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar (creating a "mortar wash" sloping towards exterior face of wall) and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
 - a. Where flashing is within air cavity, place through-wall flashing on sloping bed of mortar (creating a "mortar wash").
 - b. At bases of walls, where flashing abuts a vertical obstruction such as hollow metal frame, aluminum frame, etc., place through-wall flashing on sloping bed of mortar (creating a "mortar wash") to slope away from obstruction for 4 inches.
 2. At multiwythe masonry walls, including cavity walls, provide through wall flashing with stainless steel drip edge. Continuously adhere drip edge to supporting substrate and then adhere through wall flashing to drip edge. Extend flashing from exterior face of outer wythe, through outer wythe, across airspace and over mortar wash, turned up not less than 16 inches onto backup substrate. Securely fasten top of flashing to backup substrate with continuous termination bars. Anchor termination bars to backup substrate and seal top of termination bar watertight.
 - a. Where through-wall flashing abuts vertical obstructions and becomes discontinuous, turn up not less than 2 inches to form end dams and seal watertight to adjacent construction and trim flush with exterior face of masonry.
 3. At masonry-veneer walls, provide through wall flashing with stainless steel drip edge. Continuously adhere drip edge to veneer and then adhere through wall flashing to drip edge. Extend flashing through veneer, across airspace behind veneer and over mortar wash, turned up not less than 16 inches onto backup substrate (sheathing, concrete, etc). Overlap through wall flashing to-air barrier, lapping at least 4 inches, unless otherwise indicated. Securely fasten top of flashing to backup substrate with continuous termination bars. Anchor termination bars to backup substrate and seal top of termination bar watertight.
 - a. Where through-wall flashing abuts vertical obstructions and becomes discontinuous, turn up not less than 2 inches to form end dams and seal watertight to adjacent construction and trim flush with exterior face of masonry.
 4. At lintels and shelf angles, extend flashing a minimum of 8 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams. Extend flashing up exterior face of backup substrate not less than 16 inches and terminate with terminations bars and sealant as previously specified. Trim flashing at end dams flush to exterior brick face.
 5. Drip Edges: Provide metal drip edges beneath flexible flashing (through wall flashing) at exterior face of wall at all locations where through-wall flashing extends to exterior. Extend 1/2 inch beyond exterior face of outer wythe and pre-bend to form a drip.
 - a. Adhered stainless steel drip edge to lintel and adhered to flexible through-wall flashing on top of drip edge, overlapping 1-1/2 inches, minimum. Through wall flashing shall be held back from exterior face of masonry 1/2 inch.
 6. Termination Drip Edging: Provide stainless steel termination drip edging over exposed exterior flanges of lintels.
 7. Cores: Fill cores in masonry below flexible through-wall flashing with mortar.
 8. Cut exposed vertical edges of flexible flashing end dams off flush with face of wall after mortar is set.
 9. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.
- C. Install counterflashing receivers and nailers for flashing and other related construction where they are shown to be built into masonry.
1. Fill cavity behind veneer with insulation as required to support mortar wash.
 2. Install receiver with back down leg tight to brick.
 3. Form mortar wash starting at back of brick and slope upward 1/2 inch at backup wall.
 4. Install windowsill receiver (pan) starting at back of window line.
- D. Install weep holes/cavity vents in exterior wythes and veneers at head joints of first course of masonry immediately above embedded flashing.
1. Use specified weep/cavity vent products to form weep holes.
 2. Use wicking material to form weep holes above flashing under brick sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
 3. Space weep holes/cavity vents at 24 inches o.c. unless otherwise indicated.
 4. Space weep holes formed from wicking material 16 inches o.c.
 5. Trim wicking material flush with outside face of wall after mortar has set.
- E. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.
- F. Install cavity vents in head joints in exterior wythes at 24 inches on center. Use specified weep/cavity vent products to form cavity vents.

3.16 MOISTURE BARRIER

- A. Refer to Section 071326 "Self-Adhered Sheet Waterproofing" for additional moisture barrier system installation requirements.
- B. Prepare masonry surface so they are smooth and free from projections that could puncture moisture barrier.
- C. Prime CMU wall surface then install moisture barrier.
- D. Roll entire surface then seal all lap seams with mastic.
- E. Schedule work so moisture barrier is not exposed to UV more than 30 days or protect from UV.

3.17 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
 - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- C. Grouting:
 - 1. Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
 - 2. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 - 3. Do not reconsolidate self-consolidating grout.
 - 4. Limit height of vertical grout pours to not more than 60 inches.

3.18 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- B. Inspections: Special inspections according to TMS 402/ACI 530/ASCE 5 as follows:
- C. Inspections: Special inspections according to TMS 402/602-16 as follows:
 - 1. Level "2" for all areas except High Wind Areas.
 - 2. Level "3" for High Wind Areas.
 - 3. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
 - 4. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
 - 5. Place grout only after inspectors have verified proportions of site-prepared grout.
- D. Testing Prior to Construction: One set of tests.
- E. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof. Reference the Statement of Special Inspections for additional requirements.
- F. Clay Masonry Unit Test: For each type of unit provided, according to ASTM C 67 for compressive strength.
- G. Mortar Aggregate Ratio Test (Proportion Specification): For site-mixed mortar, test each mix provided, according to ASTM C 780.

- H. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.
- I. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

3.19 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on mockup sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 - 5. Initially, clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20. Where initial cleaning results are not satisfactory as judged by Architect from testing on mockup, proceed to cleaning with proprietary cleaners.
 - 6. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.
 - 7. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
 - 8. Clean stone trim to comply with stone supplier's written instructions.
 - 9. Clean limestone units to comply with recommendations in ILI's "Indiana Limestone Handbook."
 - 10. Clean manufactured stone masonry with according to manufacturer's written instructions.

3.20 ADJUSTING AND CLEANING CAST STONE

- A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Architect.
- B. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.
- C. In-Progress Cleaning: Clean cast stone as work progresses.
 - 1. Remove mortar fins and smears before tooling joints.
 - 2. Remove excess sealant immediately, including spills, smears, and spatter.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed cast stone as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample; leave one sample uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of cast stone.
 - 3. Protect adjacent surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 - 4. Wet surfaces with water before applying cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
 - 5. Clean stone by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.

3.21 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Excess Masonry Waste: Remove excess clean masonry waste and other masonry waste, and legally dispose of off Owner's property.

3.22 SURFACE PREPARATION FOR FLUID APPLIED AIR BARRIERS

- A. General: This project will have fluid-applied Air Barrier material applied to the cavity side of the CMU. Special attention and care must be taken to provide a smooth, filled surface to receive the membrane. The care is necessary to insure the design performance of the selected materials. Concrete masonry unit (CMU) wall shall be prepared as follows to accept the air & vapor barrier:
 - 1. Surfaces shall be free of contaminants such as grease, oil and wax on surfaces to receive membrane.
 - 2. CMU surfaces shall be free from projections.
 - 3. Strike all mortar joints flush to the face of the masonry units.
 - 4. Fill all voids and holes greater than 1/4 inch across at any point with mortar, sealant, or other approved fill material.
 - 5. Surface irregularities exceeding 1/4 inch in height or sharp to touch shall be ground flush or made smooth.
 - 6. Fill around all penetrations with mortar, sealant or other approved fill material and strike flush.
 - 7. Remove mortar droppings on brick ties, shelf angles, brick shelves or other horizontal obstructions.

3.23 CLEANING OF EXISTING BRICK MASONRY

- A. Refer to Section 040100 "Masonry Restoration and Cleaning" for cleaning of existing brick masonry.

END OF SECTION 042000

SECTION 042200 - CONCRETE UNIT MASONRY

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Concrete masonry units
 - 2. Lintels and Bond Beams
 - a. U-Shaped Masonry Lintels
 - b. U-Shaped Masonry Bond Beams
 - 3. Mortar and Grout.
 - 4. Reinforcement
 - a. Steel reinforcing bars.
 - b. Masonry-joint reinforcement.
 - 5. Miscellaneous masonry accessories.
 - a. Compressible filler.
 - b. CMU control joint.
- B. Related Requirements:
 - 1. Section 012200 "Unit Prices" for unit prices relating to work of this Section
 - 2. Section 012300 "Alternates" for alternates effecting work of this Section.
 - 3. Section 014000 "Quality Requirements" for independent testing agency procedures and administrative requirements.

1.2 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Before installation of unit masonry, review procedures and tolerances for ensuring quality of masonry materials. Require representatives of each entity directly concerned with unit masonry to attend, including but not limited to the following:
 - a. Owner's representative
 - b. Architect and Engineer.
 - c. Contractor's superintendent.
 - d. Masonry subcontractor.
 - e. Manufacturer's representative for masonry units.
 - f. Manufacturer's representative for flashing components.
 - g. Manufacturer's representative for fluid applied air barrier system.
 - 2. Review field quality control measures for the following items:
 - a. Field dimensions and tolerances for unit masonry installation.
 - b. Installation procedures for flashing components.
 - c. Review of shop drawing elevations indicating colors of unit masonry and locations.

1.4 ACTION SUBMITTALS

- A. Shop Drawings: For the following:
 - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.

2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315. Show elevations of reinforced walls.
- B. Samples for Initial Selection:
1. Decorative concrete masonry units, in the form of small-scale units.
 2. Colored mortar.
- C. Samples for Verification: For each type and color of the following:
1. Decorative concrete masonry units, in the form of small-scale units.
 2. Special shapes for the following:
 - a. Concrete masonry units.
 - b. Decorative concrete masonry units.
 3. Pigmented and colored-aggregate mortar. Make Samples using same sand and mortar ingredients to be used on Project.
 4. Accessories embedded in masonry.

1.5 INFORMATIONAL SUBMITTALS

- A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.
1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.
- B. Qualification Data: For testing agency.
- C. Material Certificates: For each type and size of the following:
1. Masonry units.
 - a. Include material test reports substantiating compliance with requirements.
 - b. For concrete masonry units, include data and calculations establishing average net-area compressive strength of units.
 - c. For concrete masonry units included within fire resistant construction, provide certificate from manufacturer indicating compliance with ACI 216.1, latest edition for production of fire rated concrete masonry products.
 2. Cementitious materials. Include name of manufacturer, brand name, and type.
 3. Mortar admixtures.
 4. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
 5. Grout mixes. Include description of type and proportions of ingredients.
 6. Reinforcing bars.
 7. Joint reinforcement.
- D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.
- E. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.
- F. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.

- B. Mockups for Interior Walls: Build mockups to verify selections made under sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Build mockups for typical interior wall areas indicated on Drawings.
 - 2. Protect accepted mockups from the elements with weather-resistant membrane.
 - 3. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.
 - a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
 - b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.
 - 4. Subject to compliance with requirements, approved field sample(s) may become part of the completed Work.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.
- C. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.8 FIELD CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
 - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 PRODUCTS

2.1 MANUFACTURERS

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

2.2 PERFORMANCE REQUIREMENTS

- A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.
 - 1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.

2.3 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.
- C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated as determined by testing according to ASTM E119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.
 - 1. Where fire-resistance-rated construction is indicated, units shall be listed by a qualified testing agency acceptable to authorities having jurisdiction. Documentation of listing and sourcing shall be provided by manufacturer to Owner and Architect.

2.4 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
 - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 - 2. Provide bullnose units for outside corners unless otherwise indicated.
 - a. At areas indicated to receive tile as the finish surface use a non-bullnose unit at outside corners.
 - 3. Provide double bullnose units for tops of walls as indicated.
- B. Integral Water Repellent: Provide units made with integral water repellent for exposed units.
 - 1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E 514/E 514M as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or leaks on the back of test specimen.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) ACM Chemistries; RainBloc.
 - 2) BASF Aktiengesellschaft; Rheopel Plus.
 - 3) Grace Construction Products, W.R. Grace & Co. – Conn.; Dry Block.

- C. CMU: ASTM C 90.
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3750 psi.
 - 2. Density Classification: Lightweight.
 - 3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
 - 4. Fire Resistance: Concrete masonry units within fire rated wall construction shall be produced in accordance with ACI 216.1, latest edition.

2.5 MASONRY LINTELS AND BOND BEAMS

- A. U-Shaped Masonry Lintels: Prefabricated (site cast) or built-in-place masonry lintels made from U-shaped lintel bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.
- B. U-Shaped Masonry Bond Beams: Prefabricated (site cast) or built-in-place masonry bond beams made from U-shaped bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout

2.6 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
 - 1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C 114.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Aggregate for Mortar: ASTM C 144.
 - 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 - 2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- E. Aggregate for Grout: ASTM C 404.
- F. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
- G. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent from same manufacturer.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. ACM Chemistries; RainBloc for Mortar
 - b. BASF Aktiengesellschaft; Rheopel Mortar Admixture.
 - c. Grace Construction Products, W. R. Grace & Co. – Conn; Dry-Block Mortar Admixture
- H. Water: Potable.

2.7 REINFORCEMENT

- A. Uncoated-Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.
- B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
- C. Masonry-Joint Reinforcement, General: ASTM A 951/A 951M.

1. Interior Walls: Hot-dip galvanized carbon steel, Class B-2.
2. Exterior Walls: Hot-dip galvanized carbon steel, Class B-2.
3. Wire Size for Side Rods: 0.148-inch diameter.
4. Wire Size for Cross Rods: 0.148-inch diameter.
5. Wire Size for Veneer Ties: 0.148-inch diameter.
6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
7. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

D. Masonry-Joint Reinforcement for Single-Wythe Masonry: Ladder or truss type with single pair of side rods.

2.8 MISCELLANEOUS ANCHORS

- A. Post-installed Anchors: Torque-controlled expansion anchors or chemical anchors.
1. Load Capacity: 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.
 2. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F1941 (ASTM F1941M), Class Fe/Zn 5 unless otherwise indicated.
 3. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F738M) and nuts, ASTM F594 (ASTM F836M).

2.9 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene or urethane.
1. Basis of Design Product: W.R. Meadows; "Cerammar".
- B. Water Repellent: Breathable and non-staining/non-yellowing type as recommended by manufacturer of exterior decorative concrete masonry units, for application after installation.

2.10 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned. Do not use acidic cleaners on manufactured stone masonry.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Diedrich Technologies, Inc.
 - b. EaCo Chem, Inc.
 - c. ProSoCo, Inc.

2.11 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
1. Do not use calcium chloride in mortar or grout.
 2. Use portland cement-lime mortar unless otherwise indicated.
 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.
1. For masonry below grade or in contact with earth, use Type S.
 2. For reinforced masonry, use Type S.

3. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls, use Type S.
 4. For interior load-bearing walls, use Type S.
 5. For interior nonload-bearing partitions, use Type N.
 6. For other applications where another type is not indicated, use Type N.
- D. Grout for Unit Masonry: Comply with ASTM C 476.
1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
 2. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 3000 psi.
 3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
 2. Verify that foundations are within tolerances specified.
 3. Verify that reinforcing dowels are properly placed.
 4. Verify that substrates are free of substances that impair mortar bond.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build singlewythe walls to actual widths of masonry units, using units of widths indicated.
- B. Build chases and recesses to accommodate items specified in this and other Sections.
- C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.
- D. 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, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.3 TOLERANCES

- A. Dimensions and Locations of Elements:
1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
 2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
 3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.
- B. Lines and Levels:
1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
 3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.

4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
 5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
 6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet or 1/2-inch maximum.
 7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.
- C. Joints:
1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
 2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
 3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
 4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
 5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in bond pattern indicated on Drawings; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
 1. Refer to Exterior Elevations and Exterior Material Finish Legend for bond pattern.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.
- H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
 1. Fill cores in exterior masonry veneer and hollow CMUs with grout or mortar under through-wall flashing.
 2. Fill base of wall between exterior masonry veneer and CMUs (collar joint) with grout as indicated and apply mortar across top if insulation and grout to form a mortar wash directly beneath horizontal leg of through-wall flashing.
- I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
 1. Install compressible filler in joint between top of partition and underside of structure above.
 2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c. unless otherwise indicated.
 3. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078443 "Joint Firestopping."

3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow brick and CMUs as follows:
 - 1. Fully bed face shells in mortar and make head joints of depth equal to bed joints.
 - 2. Fully bed webs in mortar in all courses of piers, columns, and pilasters.
 - 3. Fully bed webs in mortar in grouted masonry, including starting course on footings.
 - 4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
 - 5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.
- B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

3.6 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
 - 1. Space reinforcement not more than 16 inches o.c.
 - 2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
 - 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement].
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units or provide rigid anchors.
- D. Provide continuity at corners by using prefabricated L-shaped units or provide rigid anchors.

3.7 CONTROL AND EXPANSION JOINTS

- A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry as follows:
 - 1. At 4-hour fire-rated walls, fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
 - 2. At 2-hour fire-rated walls, install sash block on each side of joint, install preformed gasket, rake back mortar to allow for installation of backer rod and sealant, or install square-end block on each side of joint, fill head joint between block with ceramic fiber felt, rake back mortar to allow for installation of backer rod and sealant.
 - 3. At non-fire-rated walls, install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.
- C. Provide horizontal, pressure-relieving joints by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 079200 "Joint Sealants," but not less than 3/8 inch.
 - 1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.8 LINTELS

- A. Install steel lintels where indicated.
- B. Provide masonry lintels where shown and where openings of more than 24 inches for block-size units are shown without structural steel or other supporting lintels.

- C. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.9 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
 - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
 - 1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 - 2. Limit height of vertical grout pours to not more than 60 inches.

3.10 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- B. Inspections: Special inspections according to TMS 402/ACI 530/ASCE 5 as follows:
 - 1. Level "B" for all areas except High Wind Areas and Storm Shelters.
 - 2. Level "C" for High Wind Areas and Storm Shelters.
 - 3. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
 - 4. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
 - 5. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.
- D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
- E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
- F. Mortar Aggregate Ratio Test (Proportion Specification): For site-mixed mortar, test each mix provided, according to ASTM C 780.
- G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.
- H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

3.11 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 2. Test cleaning methods on mockup sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 5. Initially, clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20. Where initial cleaning results are not satisfactory as judged by Architect from testing on mockup, proceed to cleaning with proprietary cleaners.
 6. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.
 7. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

3.12 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Excess Masonry Waste: Remove excess clean masonry waste and other masonry waste, and legally dispose of off Owner's property.

3.13 SURFACE PREPARATION

- A. General: This project will have fluid-applied Air Barrier material applied to the cavity side of the CMU. Special attention and care must be taken to provide a smooth, filled surface to receive the membrane. The care is necessary to insure the design performance of the selected materials. Concrete masonry unit (CMU) wall shall be prepared as follows to accept the air & vapor barrier:
1. Surfaces shall be free of contaminants such as grease, oil and wax on surfaces to receive membrane.
 2. CMU surfaces shall be free from projections.
 3. Strike all mortar joints flush to the face of the concrete block.
 4. Fill all voids and holes greater than ¼ inch across at any point with mortar, sealant or other approved fill material.
 5. Surface irregularities exceeding ¼ inch in height or sharp to touch shall be ground flush or made smooth.
 6. Fill around all penetrations with mortar, sealant or other approved fill material and strike flush.
 7. Remove mortar droppings on brick ties, shelf angles, brick shelves or other horizontal obstructions.

END OF SECTION 042200

SECTION 047200 - CAST STONE MASONRY

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Cast-stone (047200.A01) including the following:
 - a. Window sills.
 - b. Lintels.
 - c. Surrounds.
 - d. Coping.
 - e. Cornices
 - f. Wall caps.
 - g. Belt courses.
 - h. Water tables.
 - i. Quoins.
 - j. Pilasters.
 - k. Column covers.
 - l. Medallions.
- B. Related Sections:
 - 1. Section 012300 "Alternates" for those alternates effecting work of this Section.
 - 2. Section 034100 "Structural Precast Concrete" for casting into structural precast concrete panels
 - 3. Section 042000 "Unit Masonry" for installing cast-stone units in unit masonry.
 - 4. Section 071900 "Water Repellants and Sealers" for anti-graffiti coatings.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. For cast-stone units, include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Show fabrication and installation details for cast-stone units. Include dimensions, details of reinforcement and anchorages if any, and indication of finished faces.
 - 1. Include building elevations showing layout of units, locations of joints and anchors and locations for pre-manufactured corner units.
- C. Samples for Initial Selection: For colored mortar.
- D. Samples for Verification:
 - 1. For each color and texture of cast stone required, 8 to 10 inches square in size.
 - 2. For each trim shape required, 10 inches in length.
 - 3. For colored mortar, make Samples using same sand and mortar ingredients to be used on Project.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer of cast-stone units similar to those indicated for this Project, that has sufficient production capacity to manufacture required units, and is a plant certified by the Cast Stone Institute or the Architectural Precast Association.
- B. Mockups: Furnish cast stone for installation in mockups specified in Section 042000 "Unit Masonry."
 - 1. Build mockup of typical wall area as shown on Drawings and as described in Section 042000.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Coordinate delivery of cast stone with unit masonry work to avoid delaying the Work and to minimize the need for on-site storage.
- B. Pack, handle, and ship cast-stone units in suitable packs or pallets.
 - 1. Lift with wide-belt slings; do not use wire rope or ropes that might cause staining. Move cast-stone units if required, using dollies with wood supports.
 - 2. Store cast-stone units on wood skids or pallets with nonstaining, waterproof covers, securely tied. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Cast Stone: Obtain cast-stone units from single source from single manufacturer.
- B. Basis-of-Design Product: Subject to compliance with requirements, provide cast stone units by Continental Cast Stone, or comparable product submitted to and accepted by Architect prior to bidding.

2.2 CAST-STONE MATERIALS

- A. General: Comply with ASTM C 1364.
- B. Portland Cement: ASTM C 150/C 150M, Type I or Type III, containing not more than 0.60 percent total alkali when tested according to ASTM C 114. Provide natural color cement as required to produce cast-stone color indicated.
- C. Coarse Aggregates: Granite, quartz, or limestone complying with ASTM C 33/C 33M; gradation and colors as needed to produce required cast-stone textures and colors.
- D. Fine Aggregates: Natural sand or crushed stone complying with ASTM C 33/C 33M, gradation and colors as needed to produce required cast-stone textures and colors.
- E. Color Pigment: ASTM C 979/C 979M, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.
- F. Water: Clean and potable.
- G. Admixtures: Use only admixtures specified or approved in writing by Architect.
 - 1. Do not use admixtures that contain more than 0.1 percent water-soluble chloride ions by mass of cementitious materials. Do not use admixtures containing calcium chloride.
 - 2. Use only admixtures that are certified by manufacturer to be compatible with cement and other admixtures used.
 - 3. Air-Entraining Admixture: ASTM C 260. Add to mixes for units exposed to the exterior at manufacturer's prescribed rate to result in an air content of 4 to 6 percent, except do not add to zero-slump concrete mixes.
 - 4. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
- H. Reinforcement: Deformed steel bars complying with ASTM A 615/A 615M, Grade 60. Use galvanized reinforcement when covered with less than 1-1/2 inches of cast-stone material.
 - 1. Galvanized Coating: ASTM A 767/A 767M.
- I. Embedded Anchors and Other Inserts: Fabricated from stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666, Type 304.

2.3 CAST-STONE UNITS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide each type of cast stone from Continental Cast Stone Mfg.; or comparable products meeting specified requirements, from one of the following:
 - 1. Accent Cast Stone.
 - 2. Architectural Art Stone.
 - 3. Architectural Ornaments, Inc.
 - 4. Concrete Design, Inc.
 - 5. Midwest Cast Stone.
- B. Regional Materials: Cast-stone units shall be manufactured within 500 miles of Project site from aggregates [and cement] that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.
- C. Cast-Stone Units: Comply with ASTM C 1364.
 - 1. Units shall be manufactured using the vibrant dry tamp or wet-cast method.
 - 2. Units shall be resistant to freezing and thawing as determined by laboratory testing according to ASTM C 666/C 666M, Procedure A, as modified by ASTM C 1364.
- D. Fabricate units with sharp arris and accurately reproduced details, with indicated texture on all exposed surfaces unless otherwise indicated.
 - 1. Slope exposed horizontal surfaces 1:12 to drain unless otherwise indicated.
 - 2. Provide drips on projecting elements unless otherwise indicated.
- E. Fabrication Tolerances:
 - 1. Variation in Cross Section: Do not vary from indicated dimensions by more than 1/8 inch.
 - 2. Variation in Length: Do not vary from indicated dimensions by more than 1/360 of the length of unit or 1/8 inch, whichever is greater, but in no case by more than 1/4 inch.
 - 3. Warp, Bow, and Twist: Not to exceed 1/360 of the length of unit or 1/8 inch, whichever is greater.
 - 4. Location of Grooves, False Joints, Holes, Anchorages, and Similar Features: Do not vary from indicated position by more than 1/8 inch on formed surfaces of units and 3/8 inch on unformed surfaces.
- F. Cure Units as Follows:
 - 1. Cure units in enclosed, moist curing room at 95 to 100 percent relative humidity and temperature of 100 deg F for 12 hours or 70 deg F for 16 hours.
 - 2. Keep units damp and continue curing to comply with one of the following:
 - a. No fewer than five days at mean daily temperature of 70 deg F or above.
 - b. No fewer than six days at mean daily temperature of 60 deg F or above.
 - c. No fewer than seven days at mean daily temperature of 50 deg F or above.
 - d. No fewer than eight days at mean daily temperature of 45 deg F or above.
- G. Acid etch units after curing to remove cement film from surfaces to be exposed to view.
- H. Colors and Textures: Provide units with fine-grained texture and buff color resembling smooth-finished Indiana limestone.

2.4 MORTAR MATERIALS

- A. Provide mortar materials that comply with Section 042000 "Unit Masonry."
- B. Regional Materials: Aggregate for mortar [cement, and lime] shall be manufactured within 500 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.

2.5 ACCESSORIES

- A. Anchors: Type and size indicated, fabricated from Type 304 stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666.

- B. Dowels: 1/2-inch-diameter round bars, fabricated from Type 304 stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666.
- C. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cast-stone manufacturer and expressly approved by cleaner manufacturer for use on cast stone and adjacent masonry materials.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Diedrich Technologies, Inc.
 - b. EaCo Chem, Inc.
 - c. ProSoCo, Inc.

2.6 MORTAR MIXES

- A. Comply with requirements in Section 042000 "Unit Masonry" for mortar mixes.

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 the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SETTING CAST STONE IN MORTAR

- A. Set cast stone as indicated on Drawings. Set units accurately in locations indicated, with edges and faces aligned according to established relationships and indicated tolerances.
 - 1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
 - 2. Coordinate installation of cast stone with installation of flashing specified in other Sections.
- B. Wet joint surfaces thoroughly before applying mortar or setting in mortar.
- C. Set units in full bed of mortar with full head joints unless otherwise indicated.
 - 1. Set units with joints 3/8 to 1/2 inch wide unless otherwise indicated.
 - 2. Build anchors and ties into mortar joints as units are set.
 - 3. Set cast stone supported on clip or continuous angles on resilient setting shims. Use material of thickness required to maintain uniform joint widths. Hold shims back from face of cast stone a distance at least equal to width of joint.
 - 4. Fill dowel holes and anchor slots with mortar.
 - 5. Build concealed flashing into mortar joints as units are set.
 - 6. Keep head joints in copings and between other units with exposed horizontal surfaces open to receive sealant.
 - 7. Keep collar joints open to receive sealant.
 - 8. Keep joints at shelf angles open to receive sealant.
- D. Tool exposed joints slightly concave when thumbprint hard. Use a smooth plastic jointer larger than joint thickness.
- E. Provide sealant joints at head joints of copings and other horizontal surfaces; at expansion, control, and pressure-relieving joints; and at locations indicated. Provide sealant to fill open collar joints.
 - 1. Keep joints free of mortar and other rigid materials.
 - 2. Keep cavities open where unfilled space is indicated between back of cast stone units and backup wall; do not fill cavities with mortar or grout.
 - 3. Build in compressible foam-plastic joint fillers where indicated.
 - 4. Form joint of width indicated, but not less than 3/8 inch.

5. Prime cast-stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.
6. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Section 079200 "Joint Sealants."

3.3 ADJUSTING AND CLEANING

- A. Remove and replace stained and otherwise damaged units and units not matching approved Samples.
- B. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.
- C. In-Progress Cleaning: Clean cast stone as work progresses.
 1. Remove mortar fins and smears before tooling joints.
 2. Remove excess sealant immediately, including spills, smears, and spatter.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed cast stone as follows:
 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 2. Test cleaning methods on sample; leave one sample uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of cast stone.
 3. Protect adjacent surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 4. Wet surfaces with water before applying cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
 5. Clean cast stone by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
 6. Clean cast stone with proprietary acidic cleaner applied according to manufacturer's written instructions.

END OF SECTION 047200

This page intentionally left blank

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Structural steel, including, but not limited to the following:
 - a. W-Shapes
 - b. Angles
 - c. Plate and Bar
- B. Related Requirements:
 - 1. Section 012100 "Allowances" for those allowances affecting work of this Section.
 - 2. Section 012200 "Unit Prices" for unit prices relating to work of this Section
 - 3. Section 014000 "Quality Requirements" for independent testing agency procedures and administrative requirements.
 - 4. Section 055000 "Metal Fabrications" for steel lintels not attached to structural-steel frame miscellaneous steel fabrications and other steel items not defined as structural steel.

1.2 DEFINITIONS

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.3 COORDINATION

- A. 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.
- 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.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site at biweekly intervals.
 - 1. Before installation of structural steel framing, review procedures and tolerances for ensuring quality of structural steel framing materials. Require representatives of each entity directly concerned with structural steel framing to attend, including but not limited to the following:
 - a. Owner's representative
 - b. Architect and/or Structural Engineer.
 - c. Contractor's superintendent.
 - d. Structural Steel Framing subcontractor.
 - e. Manufacturer's representative for structural steel framing.
 - 2. Review field quality control measures for the following items:
 - a. Field dimensions and tolerances for structural steel framing installation.

1.5 ACTION SUBMITTALS

- A. Shop Drawings: Show fabrication of structural-steel components.
 - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 - 2. Include embedment Drawings.

3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
5. For structural-steel connections indicated to comply with design loads, include structural design data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: Submit for each of the following.
 1. Installer.
 2. Fabricator.
 3. Professional engineer.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Mill test reports for structural steel, including chemical and physical properties.
- E. Product Test Reports: For the following:
 1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 2. Direct-tension indicators.
 3. Tension-control, high-strength, bolt-nut-washer assemblies.
 4. Shear stud connectors.
 5. Shop primers.
 6. Shrinkage-resistant grout.
- F. Survey of existing conditions.
- G. Source quality-control reports.
- H. Field quality-control and special inspection reports.

1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU or is accredited by the IAS Fabricator Inspection Program for Structural Steel (Acceptance Criteria 172).
 1. Non-certified fabricators shall submit their qualifications with their bid. Qualifications shall be submitted on AIA Document A305 "Qualifications Statement", include the following for each project listed: references for at least 3 projects, identify engineer-of-record, tonnage of steel fabricated and type of steel fabricated (structural, miscellaneous, etc.).
- B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE, and as follows:
 1. A firm with not less than ten (10) years of experience under the current name.
 2. Must have completed five (5) projects within the past 5 years of comparable size and scope.
 3. Non-certified erectors shall submit their qualifications with their bid. Qualifications shall be submitted on AIA Document A305 "Qualifications Statement", include the following for each project listed: references for at least 3 projects, identify engineer-of-record, tonnage of steel erected and type of steel erected (structural, miscellaneous, etc.).
- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- D. Comply with applicable provisions of the following specifications and documents:
 1. AISC 303.
 2. AISC 360.

3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.8 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with structural steel framing by field measurements before fabrication.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of connections required by the Contract Documents to be selected or completed by structural-steel fabricator, including comprehensive engineering analysis by a qualified professional engineer, to withstand loads indicated and comply with other information and restrictions indicated.
1. Select and complete connections using schematic details indicated and AISC 360.
 2. Use Allowable Stress Design; data are given at service-load level.

2.2 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992/A 992M.
- B. Channels, Angles, M, S-Shapes: ASTM A 36/A 36M.
- C. Plate and Bar: ASTM A 36/A 36M.
- D. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade C, structural tubing.
- E. Steel Pipe: ASTM A 53/A 53M, Type E or Type S, Grade B.
1. Weight Class: Extra strong.
 2. Finish: Black except where indicated to be galvanized.
- F. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.

- B. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers with plain finish.
 - 1. Direct-Tension Indicators: ASTM F 959, Type 490, compressible-washer type with plain finish.
- C. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
 - 1. Finish: Plain.

2.4 RODS

- A. Unheaded Anchor Rods: ASTM F 1554, Grade 55, weldable.
 - 1. Configuration: Straight.
 - 2. Nuts: ASTM A 563 heavy-hex carbon steel.
 - 3. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 4. Washers: ASTM F 436, Type 1, hardened carbon steel.
 - 5. Finish: Plain.

2.5 PRIMER

- A. Primer: Fabricator's standard lead- and chromate-free, non-asphaltic, rust-inhibiting primer compatible with topcoat.
- B. Galvanizing Repair Paint: ASTM A 780/A 780M.

2.6 SHRINKAGE-RESISTANT GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

2.7 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.
 - 1. Camber structural-steel members where indicated.
 - 2. Fabricate beams with rolling camber up.
 - 3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
 - 4. Mark and match-mark materials for field assembly.
 - 5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
 - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
 - 2. Thermal cutting is not allowed at the project site.
- C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 1, "Solvent Cleaning," or SSPC-SP 2, "Hand Tool Cleaning."
- F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

- G. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
 - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
 - 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.8 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.
 - 2. Erection plates shall be removed after welding and prior to finishing.
 - 3. Exposed welded connections lower than 25'-0" above finished floor shall be finished to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds; no evidence of a welded joint.

2.9 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
 - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 - 2. Surfaces to be field welded.
 - 3. Surfaces of high-strength bolted, slip-critical connections.
 - 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 - 5. Galvanized surfaces.
 - 6. Surfaces enclosed in interior construction (not exposed-to-view in final position).
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 - 1. SSPC-SP 3, "Power Tool Cleaning."
 - 2. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

2.10 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
 - 1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
 - 2. Galvanize lintels, shelf angles and welded door frames attached to structural-steel frame and located in exterior walls.

2.11 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Bolted Connections: Inspect shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 1. Liquid Penetrant Inspection: ASTM E 165.
 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 3. Ultrasonic Inspection: ASTM E 164.
 4. Radiographic Inspection: ASTM E 94.
- D. In addition to visual inspection, test and inspect shop-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
 1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.
- E. Prepare test and inspection reports.
- F. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents
- G. Special Inspections: Owner will retain and pay for the services of a qualified independent inspection agency acceptable to the Architect to conduct special inspections of all structural welding and high-strength bolting in accordance with applicable requirements of Section 1704 of the International Building Code, latest edition, as adopted and amended by authority having jurisdiction. The inspection agency shall inspect the work, prepare and submit periodic reports and final reports to City Code Officials, Architect, and Owner in compliance with building code requirements.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
 1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
 1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Baseplates Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
 2. Weld plate washers to top of baseplate.
 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
1. Level and plumb individual members of structure.
 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection unless approved by Structural Engineer of Record. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.
- I. Structural Thermal Break Material: Install per manufacturer's written recommendations to achieve load performance indicated by Structural Drawings. Installation methods shall be submitted to Structural Engineer for review of compliance with design intent only.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
 3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
1. Verify structural-steel materials and inspect steel frame joint details.
 2. Verify weld materials and inspect welds.
 3. Verify connection materials and inspect high-strength bolted connections.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
1. Bolted Connections: Inspect and test bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
 2. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.
 - a. In addition to visual inspection, test and inspect field welds according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

- 1) Liquid Penetrant Inspection: ASTM E 165.
 - 2) Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - 3) Ultrasonic Inspection: ASTM E 164.
 - 4) Radiographic Inspection: ASTM E 94.
- C. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

3.6 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780/A 780M.
- B. Touchup Prime Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

END OF SECTION

SECTION 054000 - COLD FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the following applications of cold-formed metal framing:
 - 1. Interior non-load-bearing wall framing exceeding height limitations of standard, nonstructural metal framing.
 - 2. Interior load-bearing wall framing
 - 3. Ceiling and floor joist framing.
 - 4. Miscellaneous framing and furring members.
- B. Related Requirements:
 - 1. Section 055000 "Metal Fabrications" for miscellaneous steel shapes, masonry shelf angles, and connections used with cold-formed metal framing.
 - 2. Section 092116 "Non-Structural Metal Framing" for standard, interior non-load-bearing, metal-stud framing, with height limitations and ceiling-suspension assemblies.
 - 3. Section 092117 "Gypsum Board Shaft Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies, with height limitations.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Before installation of cold formed metal framing, review procedures and tolerances for ensuring quality of metal framing materials. Require representatives of each entity directly concerned with cold-formed metal framing to attend, including but not limited to the following:
 - a. Owner's representative
 - b. Architect.
 - c. Contractor's superintendent.
 - d. Cold Formed Metal Framing subcontractor.
 - e. Manufacturer's representative for cold-formed metal framing.
 - 2. Review field quality control measures for the following items:
 - a. Field dimensions and tolerances for cold formed metal framing installation.
 - b. Coordination of items where blocking is required

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of cold-formed steel framing product and accessory.
- B. Shop Drawings:
 - 1. Include layout, spacings, 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.
 - 3. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Welding certificates.
- C. Evaluation Reports: For nonstandard cold-formed steel framing post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.
- C. Product Tests: Mill certificates or data from a qualified independent testing agency, indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- D. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association, the Steel Framing Industry Association or the Steel Stud Manufacturers Association.
- E. 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."

1.6 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide cold-formed metal framing by one of the following:
 - 1. All Steel and Gypsum Products.
 - 2. CEMCO; California Expanded Metal Products Company.
 - 3. Clark-Dietrich Metal Framing.
 - 4. Custom Stud, Inc.
 - 5. MBA Building Supplies.
 - 6. MarinoWare; a division of Ware Industries.
 - 7. SCAFCO Corporation.
 - 8. Steel Construction Systems.
 - 9. Steel Network, Inc.
 - 10. Steel Structural Systems.
 - 11. United Metal Products, Inc.

2.2 PERFORMANCE REQUIREMENTS

- A. Cold-Formed Steel Framing Design Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100, AISI S200, and the following:
 - 1. Floor and Roof Systems: AISI S210.
 - 2. Wall Studs: AISI S211.
 - 3. Headers: AISI S212.
 - 4. Lateral Design: AISI S213.
- B. 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.

2.3 COLD-FORMED STEEL FRAMING, GENERAL

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
 - 1. Grade: As required by structural performance.
 - 2. Coating: G60.
- C. Steel Sheet for Vertical Deflection and Drift Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
 - 1. Grade: As required by structural performance.
 - 2. Coating: G60.

2.4 INTERIOR WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness:
 - a. For horizontal framing members: 0.0428 inch
 - b. For vertical framing members (where welding occurs): 0.0966 inch.
 - 2. Flange Width: 1-5/8 inches minimum.
 - 3. Section Properties: Per SSMA or as required by structural performance.
- 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: Matching steel studs.
 - 2. Flange Width: 1-1/4 inches.
- C. Vertical Deflection 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.

2.5 MISCELLANEOUS FRAMING

- A. General: Manufacturer's standard Z-shaped and hat-shaped steel sections, of web depths indicated, and as follows:
 - 1. Minimum Uncoated Base-Metal Thickness: 0.0538 inch.
 - 2. Z-Furring: Manufacturer's standard slotted or non-slotted web, face flange of at least 1-1/4 inches and wall attachment flange of 7/8 inch.
 - 3. Hat Channels: Manufacturer's standard profile.
 - 4. Depth/Height:
 - a. For Z-furring: 3 inches, unless otherwise indicated.
 - b. For hat channels: 7/8 inch, unless otherwise indicated.

2.6 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.

2.7 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 55, threaded carbon-steel headless bolts, with encased end threaded, 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. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC508 or ICC-ES AC308 as appropriate for the substrate.
 1. Uses: Securing cold-formed steel framing to structure.
 2. Type: Torque-controlled adhesive anchor or adhesive anchor.
 3. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
 4. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.
- D. Power-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, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.

2.8 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20 or ASTM A 780.
- B. Nonmetallic, Non-shrink Grout: Premixed, nonmetallic, noncorrosive, non-staining 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.
- C. Shims: Load bearing, high-density multimonomer plastic, and non-leaching; or of cold-formed steel of same grade and coating as framing members supported by shims.
- D. Isolation Strip beneath Runner Tracks at Exterior Walls: Provide one of the following:
 1. Polyethylene-sheet backed rubberized asphalt membrane, 40 mils thick. Field cut to match widths of runners.
 2. Lamatek; 0.25 inch by 5.87 inches SCE-41 plain neoprene sponge rubber. Furnish in not less than 50 foot rolls.

2.9 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. 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 inch in 10 feet and as follows:
1. Spacing: Space individual framing members no more than plus or minus 1/8 inch 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 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. 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 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.
- B. Install isolation strips beneath runner tracks at exterior walls.

3.3 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
- 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 07 21 00 "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 inch in 10 feet and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 INTERIOR WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
 - 1. Do not fasten studs to outer track of double deflection tracks.
 - 2. Stud Spacing: 16 inches, maximum.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 - 1. Do not fasten studs to outer track of double deflection tracks.
 - 2. Install single deep-leg deflection tracks and anchor to building structure.
 - 3. Install double deep-leg deflection tracks and anchor outer track to building structure.
 - 4. Connect vertical deflection clips to bypassing and infill studs and anchor to building structure.
 - 5. Connect drift clips to cold-formed metal framing 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 inches apart. Fasten at each stud intersection.
 - 1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
 - 2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
- 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.

3.5 MISCELLANEOUS FRAMING INSTALLATION

- A. General:
 - 1. Where miscellaneous framing is installed parallel to stud framing in wall, align miscellaneous framing over studs. Securely anchor at corners and ends, and at spacings as follows:
 - a. Anchor Spacing: As shown on Shop Drawings.
 - 2. Where miscellaneous framing is installed perpendicular to stud framing in wall, secure over studs. Securely anchor at corners and ends, and at spacing as follows:
 - a. Anchor Spacing: As shown on Shop Drawings.
 - 3. Set miscellaneous framing plumb, level and true to plane.

3.6 ERECTION TOLERANCES

- A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.7 FIELD QUALITY CONTROL

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

3.8 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 054000

SECTION 055000 - METAL FABRICATIONS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Miscellaneous Steel Framing and Supports (055000.A01) for:
 - a. Storefront and curtain wall.
 - b. Overhead doors.
 - c. Operable partitions.
 - d. Countertops.
 - e. Low Partitions.
 - f. Mechanical and Electrical equipment.
 - g. Bracing of partition non-load bearing CMU walls.
 - h. Steel framing and support for applications where framing and supports are not specified in other Sections.
 - 2. Shelf angles (055000.A05).
 - 3. Miscellaneous steel trim (055000.A13).
 - 4. Stair Treads with Nosing (055000.A27).
 - 5. Loose bearing and leveling plates (055000.A21) for applications where they are not specified in other Sections.
 - 6. Slotted-channel inserts and ceiling assembly.
- B. Products furnished, but not installed, under this Section include the following:
 - 1. Loose steel lintels (055000.A22).
 - 2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
 - 3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.
- C. Related Requirements:
 - 1. Section 012100 "Allowances" for those allowances affecting work of this Section.
 - 2. Section 012200 "Unit Prices" for those unit prices affecting work of this Section.
 - 3. Section 012300 "Alternates" for those alternates effecting work of this Section.
 - 4. Section 033000 "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts, and other items cast into concrete.
 - 5. Section 042000 "Unit Masonry" for installing loose lintels, anchor bolts, and other items built into unit masonry.
 - 6. Section 051200 "Structural Steel Framing" for steel framing, supports, elevator machine beams, hoist beams, divider beams, door frames, and other steel items attached to the structural-steel framing.

1.2 COORDINATION

- A. 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.
- B. Coordinate installation of metal fabrications that are anchored to or that receive other work. 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.

1.3 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Paint products.
 - 2. Shrinkage-resisting grout.

3. Slotted channel framing.
- B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:
1. Miscellaneous steel framing and supports.
 - a. Steel framing and supports for operable partitions.
 - b. Steel framing and supports for overhead doors.
 - c. Steel framing and supports for countertops.
 - d. Steel tube reinforcement for low partitions.
 - e. Steel framing and supports for mechanical and electrical equipment.
 - f. Bracing of partition non-load bearing CMU walls.
 - g. Steel framing and supports for applications where framing and supports are not specified in other Sections.
 2. Shelf angles.
 3. Loose steel lintels.
- C. Samples for Verification: For each type and finish of extruded nosing and tread.
- D. Delegated-Design Submittal: For items indicated under Performance Requirements, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that engineer is licensed in the jurisdiction in which Project is located.
- B. Mill Certificates: Signed by stainless-steel manufacturers, certifying that products furnished comply with requirements.
- C. Welding certificates.
- D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- E. Research/Evaluation Reports: For post-installed anchors, from ICC-ES.

1.5 QUALITY ASSURANCE

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

1.6 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.7 SEQUENCING

- A. Deliver steel bearing plates to be built into cast-in-place concrete and masonry construction.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design the following.
 - 1. Connections to Building Structure.
 - a. Delegated design engineer shall coordinate with structural engineer to design connections to building structure.
- B. Structural Performance of Aluminum Ladders: Ladders, including landings, shall withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

2.2 METALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- C. Steel Channels, Plates, Shapes, and Bars: ASTM A 36/A 36M.
- D. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, Type 304.
- E. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- F. 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.
- G. Rolled-Stainless-Steel Floor Plate: ASTM A 793.
- H. Abrasive-Surface Floor Plate: Steel plate with abrasive material metallically bonded to steel.
- I. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.
- J. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.
- K. Zinc-Coated Steel Wire Rope: ASTM A741.
 - 1. Wire Rope Fittings: Hot-dip galvanized-steel connectors with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.
- L. Stainless Steel Wire Rope: Wire rope manufactured from stainless steel wire complying with ASTM A492, Type 316.
 - 1. Wire Rope Fittings: Stainless steel connectors, Type 316, with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.
- M. Steel Prestressing Strand: ASTM A416/A416M, Grade 270 (Grade 1860), low-relaxation, seven-wire, with 0.9-lb/sq. ft. (4.39-kg/sq. m) zinc coating.
 - 1. Steel Prestressing Strand Fittings: Hot-dip galvanized-steel anchors and connectors with capability to sustain, without failure, a load equal to minimum breaking strength of steel prestressing strand with which they are used.

- N. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4, and as follows:
 - 1. Size of Channels: 1-5/8 by 1-5/8 inches.
 - 2. Material: Galvanized steel, ASTM A 653/A 653M, with G90 (Z275) coating.
- O. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.
- P. Aluminum Plate and Sheet: ASTM B 209, Alloy 6061-T6.
- Q. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.
- R. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
- S. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.
- T. Bronze Extrusions: ASTM B455, Alloy UNS No. C38500 (extruded architectural bronze).
- U. Bronze Castings: ASTM B584, Alloy UNS No. C83600 (lead red brass) or UNS No. C84400 (lead semired brass).
- V. Nickel Silver Extrusions: ASTM B151/B151M, Alloy UNS No. C74500.
- W. Nickel Silver Castings: ASTM B584, Alloy UNS No. C97600 (20 percent lead nickel bronze).

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 - 1. Provide stainless-steel fasteners for fastening aluminum.
 - 2. Provide stainless-steel fasteners for fastening stainless steel.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
- C. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325 (Grade A325M), Type 3, heavy-hex steel structural bolts; ASTM A563, Grade DH3, (ASTM A563M, Class 10S3) heavy-hex carbon-steel nuts; and where indicated, flat washers.
- D. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593; with hex nuts, ASTM F 594; and, where indicated, flat washers; Alloy Group 1.
- E. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.
 - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- F. 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/E 488M, conducted by a qualified independent testing agency.
- G. Cast-in-Place Anchors in Concrete: 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. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
- H. 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, Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.
- I. Slotted-Channel Inserts and Ceiling Assembly: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 1-5/8 inches by length indicated with anchor straps or studs not less than 3

inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

1. Refer to Reflected Ceiling Plans on drawings for locations using this product.

2.4 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting," Section 099123 Interior Painting," and Section 099600 "High-Performance Coatings."
- B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- C. Water-Based Primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and compatible with topcoat.
- D. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
- E. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- F. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- H. Shrinkage-Resistant, Non-Metallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- I. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete"
- J. Neoprene Pads: High-strength, multipurpose neoprene rubber pads, smooth texture, thickness as indicated on drawings complying with ASTM D2000 BC, with a durometer rating of 50A and minimum tensile strength of 1,400 psi.
 1. Basis of Design: McMaster-Carr Product No. 1290N36 (12" x 12" sheet).

2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. 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 metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 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.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated, coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS (055000.A01)

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from 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.
 - 1. Fabricate units from slotted channel framing where indicated.
 - 2. Furnish inserts for units installed after concrete is placed.
 - 3. Galvanize miscellaneous framing and supports for exterior application and where indicated for interior applications.
- C. Fabricate supports for operable partitions from continuous steel beams of sizes indicated with attached bearing plates, anchors, and braces as indicated. Drill or punch bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.
- D. Galvanize miscellaneous framing and supports where indicated.
- E. Prime miscellaneous framing and supports with zinc-rich primer, if not exposed to view; or primer specified in Section 099600 "High-Performance Coatings" where exposed to view or painted.

2.7 SHELF ANGLES (055000.A05)

- A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches o.c., unless otherwise indicated.
 - 1. Provide mitered and welded units at corners.
 - 2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches larger than expansion or control joint.
- B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.
- C. Galvanize shelf angles located in exterior walls.
- D. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.8 MISCELLANEOUS STEEL TRIM (055000.A13)

- A. Unless otherwise indicated, fabricate units from 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.
 - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize exterior miscellaneous steel trim.
- D. Prime miscellaneous steel trim with zinc-rich primer, if not exposed to view; or primer specified in Section 099600 "High-Performance Coatings" where exposed to view or painted.

2.9 LOOSE BEARING AND LEVELING PLATES (055000.A21)

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
- B. Galvanize plates.
- C. Prime plates with zinc-rich primer.

2.10 LOOSE STEEL LINTELS (055000.A22)

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.
- B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span, but not less than 8 inches unless otherwise indicated.
- C. Galvanize loose steel lintels located in exterior walls.
- D. Prime loose steel lintels located in exterior walls with zinc-rich primer, if not exposed to view; or primer specified in Section 099600 "High-Performance Coatings" where exposed to view or painted.

2.11 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.12 STAIR TREADS WITH NOSING (055000.A27)

- A. Stair Treads at Concrete stairs: Provide extruded aluminum molten metal slip resistant surface free of resin, tapes, or paints.
 - 1. Basis-of-Design Products: Subject to compliance with requirements, provide the following nosing Amstep "Anti-slip Safety Stair Treads - Model No. 508A" or comparable product submitted to and accepted by Architect prior to bidding.
 - a. Size:
 - 1) Thickness: 9/32-inch.
 - 2) Depth: 8-inch
 - 3) Return: 90 degree return angle (flat back without bevel).
 - 4) Lip: 1-1/8 inch from underside.
 - 5) Width: As indicated on Drawings. Field verify.
 - b. Abrasive Filler: Aluminum oxide and silicone granules in an epoxy resin with hardener mixture. Lock into channels in the extruded aluminum base, alloy 6063-T6.
 - 1) Color as selected by Architect from manufacturer's full range.
 - c. Coefficient of friction: Per ASTM F609
 - 1) 1.02 dry
 - 2) .098 wet
- B. Stair Tread Abrasive Nosing Strips at Concrete stairs: Provide extruded aluminum molten metal slip resistant surface free of resin, tapes, or paints. Provide integral bracket to back of nosing to allow for embedment in concrete.
 - 1. Basis-of-Design Products: Subject to compliance with requirements, provide the following nosing Balco "RS - Ribbed Abrasive" or comparable product submitted to and accepted by Architect prior to bidding.
 - a. Size: Per drawings, field verify.
 - 1) Thickness: 1/4 inch.
 - 2) Depth: 11".
 - 3) Width: As indicated on the drawings.

- b. Provide manufacturer's clear rust inhibitor.
- c. Nosings shall be mechanically fastened.

2.13 FINISHES, GENERAL

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.14 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
 - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.
- C. Shop prime iron and steel items unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
 - 1. Shop prime with universal shop primer unless zinc-rich primer is indicated.
- D. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
 - 1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 3. Items Indicated to Receive Primers Specified in Section 099600 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 4. Other Items: SSPC-SP 3, "Power Tool Cleaning."
- E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.15 ALUMINUM FINISHES

- A. As-Fabricated Finish: AA-M12.
- B. Clear Anodic Finish: AAMA 611, Class I, AA-M12C22A41.

PART 3 EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. 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 exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: 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 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. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
 1. Cast Aluminum: Heavy coat of bituminous paint.
 2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor supports for operable partitions and overhead doors securely to, and rigidly brace from, building structure.

3.3 INSTALLING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with nonshrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded 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 dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 055000

This page intentionally left blank

SECTION 055213 - PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Steel pipe and tube railings and handrails (055213.A01).
 - 2. Stainless steel railing system (055213.A03).
 - 3. Handrails:
 - a. Wall-mounted stainless steel (055213.A03).
- B. Related Requirements:
 - 1. Section 061000 "Rough Carpentry" for wood blocking for anchoring railings.
 - 2. Section 092116 "Non-Structural Metal Framing" for metal backing for anchoring railings.
 - 3. Section 099600 "High-Performance Coatings" for painting railings.

1.2 COORDINATION

- A. 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.
- 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.
- C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

1.3 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Railing brackets.
 - 2. Grout, anchoring cement, and paint products.
- B. Shop Drawings: For each railing and handrail type, including plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each type of exposed finish required.
 - 1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters. Sample shall be of a fully-assembled unit not less than 2 feet in height and 2 feet in length.
 - 2. Fittings and brackets.
 - 3. Welded connections.
 - 4. Assembled Sample of railing system, made from full-size components, including top rail, post, handrail, and infill. Sample does not need to be full height.
 - a. Show method of connecting and finishing members at intersections.
- D. Delegated-Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Welding certificates.

- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.
- D. Product Test Reports: For pipe and tube railings, for tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.
- E. Evaluation Reports: For post-installed anchors, from ICC-ES.

1.5 QUALITY ASSURANCE

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

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.8 COORDINATION AND SCHEDULING

- A. 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.
- B. 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 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design railings, including attachment to building construction.
- B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbs./ ft. applied in any direction.
 - b. Concentrated load of 200 lbs. 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 lbs. applied horizontally on an area of 1 sq. ft.
 - b. Infill load and other loads need not be assumed to act concurrently.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

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

2.2 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.
 - 1. Provide type of bracket with flange tapped for concealed anchorage to threaded hanger bolt and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.
 - a. At enclosed egress stairs provide type of bracket with predrilled hole for exposed bolt anchorage and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.
 - b. Wall mounted handrail bracket for stainless steel handrails, Basis of Design: Morse Industries, Part R13-0111-000-12.

2.3 STEEL AND IRON

- A. General: Provide tube or pipe as determined from fabricator's engineering design.
- B. Tubing: ASTM A 500 (cold formed) or ASTM A 513.
 - 1. Provide galvanized finish for exterior installations and where indicated.
- C. 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.
 - 1. Provide galvanized finish for exterior installations and where indicated.
- D. Plates, Shapes, and Bars: ASTM A 36/A 36M.
- E. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

2.4 STAINLESS STEEL

- A. General: Sizes and profiles of components are indicated on Drawings.
- B. Tubing: ASTM A 554, Grade MT 304.
- C. Pipe: ASTM A 312/A 312M, Grade TP 304.
- D. Castings: ASTM A 743/A 743M, Grade CF 8 or CF 20.
- E. Sheet, Strip, Plate, and Flat Bar: ASTM A 666, Type 304.
- F. Bars and Shapes: ASTM A 276, Type 304.
 - 1. Sizes as shown on the drawings.

2.5 FASTENERS

- A. General: Provide the following:
 - 1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5 for zinc coating.
 - 2. Hot-Dip Galvanized Railings: Type 304 stainless-steel or hot-dip zinc-coated steel fasteners complying with ASTM A 153/A 153M or ASTM F 2329 for zinc coating.
 - 3. Stainless-Steel Railings: Type 304 stainless-steel fasteners.
 - 4. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

- 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.
- C. Fasteners for Interconnecting Railing Components:
 - 1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
 - 2. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.
- D. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.
 - 1. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.6 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
 - 1. For stainless steel railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
- C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- D. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- E. Shop Primers: Provide primers that comply with Section 099600 "High-Performance Coatings."
- F. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer compatible with topcoat.
 - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- G. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
- H. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- I. Intermediate Coats and Topcoats: Provide products that comply with Section 099113 "Exterior Painting," Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings."
- J. Non-shrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- K. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
 - 1. Water-Resistant Product: At exterior locations provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.7 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. Shop assemble railings 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. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
 - 1. Provide smooth surfaces and edges.
 - 2. Provide exposed surfaces free of seams to maximum extent possible.
 - 3. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that are exposed to weather in a manner that excludes water. Provide weep holes where water may accumulate.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate railings with welded connections unless otherwise indicated.
- H. 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 surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours, color, and finish of adjoining surfaces.
 - 5. Welding for all stainless steel shall be in accordance with Category 1 AESS and as follows:
 - a. Provide continuous welds of uniform size and profile.
 - b. Welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus zero inch.
 - c. Make fillet welds for of uniform size and profile with exposed face smooth and slightly concave. Do not grind unless directed to correct unacceptable work.
- I. Non-welded 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.
- J. Form Changes in Direction as Follows:
 - 1. For steel railings: As detailed on Drawings.
 - 2. For stainless steel railings: Mitered, unless detailed otherwise.
- K. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- L. Close exposed ends of railing members with prefabricated end fittings.
- M. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- N. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
 - 1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
- O. 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.

- P. For railing posts set in concrete, provide stainless-steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.
- Q. 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.

2.8 FINISHES, GENERAL

- 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: 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.
- C. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.9 STEEL AND IRON FINISHES

- A. Galvanized Railings:
 - 1. Hot-dip galvanize exterior steel railings, including hardware, after fabrication.
 - 2. Comply with ASTM A 123/A 123M for hot-dip galvanized railings.
 - 3. Comply with ASTM A 153/A 153M for hot-dip galvanized hardware.
 - 4. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
 - 5. 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.
- B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.
- C. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.
- D. For nongalvanized-steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves; however, galvanize anchors to be embedded in exterior concrete or masonry.
- E. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with requirements indicated below:
 - 1. Exterior Railings: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Railings Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 3. Railings Indicated to Receive Primers Specified in Section 099600 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 4. Other Railings: SSPC-SP 3, "Power Tool Cleaning."
- F. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 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 Section 099600 "High-Performance Coatings" are indicated.
 - 2. Do not apply primer to galvanized surfaces.
- G. Shop-Painted Finish: Comply with Section 099600 "High-Performance Coatings."
 - 1. Color: As indicated on the Material Finish Legend.
- H. High-Performance Coating: Apply epoxy intermediate and polyurethane topcoats to prime-coated surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting. Apply at spreading rates recommended by coating manufacturer.
 - 1. Color: As indicated on the Material Finish Legend.

- I. Primer and Paint Application for Welded-Wire Mesh Infill Panels: Provide manufacturer's standard finish as follows:
 - 1. Primer/Corrosion Protection: PPG Powercron 8000, applied in a four-step process.
 - 2. Finish: Powder coat, complying with TGIC-Polyester, minimum AAMA 2603.
 - a. Color as selected by Architect from manufacturer's full line.
- J. Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

2.10 ALUMINUM FINISHES

- A. 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 unacceptable. 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.
- B. Clear Anodic Finish: AAMA 611, AA-M12C22A41.
- C. 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 and Gloss: As indicated on the Material Finish Legend.

2.11 STAINLESS-STEEL FINISHES

- A. Remove tool and die marks and stretch lines, or blend into finish.
- B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- C. 180-Grit Polished Finish: Oil-ground, uniform, directionally textured finish.
- D. Directional Satin Finish: No. 4.
- 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. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements are clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- 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 are 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 inch in 3 feet.
 - 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 inch in 12 feet.

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

3.3 RAILING CONNECTIONS

- A. Non-welded Connections: 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.
- 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 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

3.4 ANCHORING POSTS

- A. Use metal sleeves preset and anchored into concrete for installing posts. After posts are inserted into sleeves, fill annular space between post and sleeve with non-shrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with non-shrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.
 - 1. At exterior locations, hold grout/anchoring material down from adjacent concrete 1/2 inch to allow for sealant. Provide bond break to inhibit 3-sided adhesion of sealant and fill joint with sealant, building up 1/8 inch and sloping away from post.
 - 2. At interior installations, tool anchoring material flush with adjacent surface.
 - a. Interior installations of posts at concrete slabs shall not include exposed flanges or fasteners.
- C. Cover anchorage joint with flange of same metal as post, attached to post with set screws.
- D. Cover anchorage joint with flange of same metal as post, welded to post after placing anchoring material.
- E. 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 as follows:
 - 1. For stainless-steel pipe railings, weld flanges to post and bolt to supporting surfaces.
 - 2. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.

3.5 ATTACHING RAILINGS

- A. Attach railings to wall with wall brackets. Provide brackets with 1-1/2-inch 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.
- B. 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, use hanger or lag bolts set into fire-retardant-treated wood backing between studs. Coordinate with stud installation to locate backing members.
 - 4. For steel-framed partitions, use self-tapping screws fastened to steel framing or to concealed steel reinforcements.

5. For steel-framed partitions, use toggle bolts installed through flanges of steel framing or through concealed steel reinforcements.

3.6 ADJUSTING AND CLEANING

- A. Clean stainless steel by washing thoroughly with clean water and soap and rinsing with clean water.
- B. 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 requirements for touching up shop-painted surfaces.
 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- C. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099113 "Exterior Painting," Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings."
- D. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A 780/A 780M.

3.7 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.

END OF SECTION 055213

This page intentionally left blank

SECTION 061000 - ROUGH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Miscellaneous framing with dimension lumber (061000.A01).
 - 2. Preservative-treated wood blocking, cants and nailers (061000.A12).
 - 3. Wood blocking, cants, and nailers (061000.A13)
 - 4. Wood Furring (061000.A15)
 - 5. Fire-Retardant-Treated Wood blocking and nailers (061000.A16).
 - 6. Rooftop support curbs (061000.A14, 061000.A17).
 - 7. Wood furring and grounds (061000.A15, 061000.A18).
 - 8. Plywood blocking panels (061000.A19).
 - 9. Fire retardant treated plywood blocking and backing panels (061000.A20).
 - 10. Preservative-treated plywood blocking panels (061000.A22)
 - 11. Flexible Strip Flashing (061000.A24).
- B. Related Requirements:
 - 1. Section 012300 "Alternates" for those alternates effecting work of this Section.
 - 2. Section 061063 "Exterior Rough Carpentry"
 - 3. Section 061600 "Sheathing" for sheathing, subflooring, and underlayment.

1.2 DEFINITIONS

- A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.
- B. Dimension Lumber: Lumber of 2 inches nominal size or greater but less than 5 inches nominal size in least dimension.
- C. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NLGA: National Lumber Grades Authority.
 - 2. SPIB: The Southern Pine Inspection Bureau.
 - 3. WCLIB: West Coast Lumber Inspection Bureau.
 - 4. WWPA: Western Wood Products Association.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. 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 and net amount of preservative retained.
 - 2. 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 based on testing by a qualified independent testing agency.
 - 3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
 - 4. 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. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.
4. Post-installed anchors.
5. Expansion anchors and metal framing anchors.

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 wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Regional Materials: The following wood products shall be manufactured within 100 miles (160 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles (160 km) of Project site.
 1. Dimension lumber, except treated materials.
- B. Certified Wood: The following wood products shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001 and FSC STD-40-004.
 1. Dimension lumber, except treated materials.
- C. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. Dress lumber, S4S, unless otherwise indicated.
- D. Maximum Moisture Content of Lumber: 19 percent for 2-inch nominal thickness or less; no limit for more than 2-inch nominal thickness unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 2. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.

- D. Application: Treat items indicated on Drawings, and the following:
1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 4. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
1. Treatment shall not promote corrosion of metal fasteners.
 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
 4. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D 5664 and design value adjustment factors shall be calculated according to ASTM D 6841. For enclosed roof framing, framing in attic spaces, and where high temperature fire-retardant treatment is indicated, provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Project's climatological zone.
- C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent. Kiln-dry plywood after treatment to maximum moisture content of 15 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- E. Application: Treat items indicated on Drawings, and the following:
1. Framing for raised platforms and stages.
 2. Plywood blocking and backing panels.
 3. Roof construction.

2.4 DIMENSION LUMBER FRAMING

- A. Miscellaneous Framing (061000.A01): No. 2 grade.
1. Species:
 - a. Hem-fir (north); NLGA.
 - b. Mixed southern pine; SPIB.
 - c. Douglas fir-larch; WCLIB or WWPA.
 2. Refer to Article 2.2 and Article 2.3 for locations of preservative treated wood and fire retardant treated wood.

2.5 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
1. Preservative-treated blocking, grounds and nailers (061000.A12).
 2. Blocking, grounds and nailers (061000.A13).
 - a. Blocking for wall-mounted cabinets and casework shall be 2x6, minimum.
 3. Curbs and cants (061000.A14).

4. Furring (061000.A15).
 5. Fire-retardant treated wood blocking and nailers (061000.A16).
 6. Fire-retardant treated wood curbs and cants (061000.A17).
 - a. Rooftop equipment bases and support curbs.
 7. Fire-retardant treated wood furring: (061000.A18).
- B. Dimension Lumber Items: Construction or No. 2 grade lumber of any of the following species:
1. Mixed southern pine or southern pine; SPIB.
 2. Spruce-pine-fir; NLGA.
 3. Spruce-pine-fir (south); NeLMA, WCLIB, or WWP.
 4. Western woods; WCLIB or WWP.
- C. Concealed Boards: 19 percent maximum moisture content and any of the following species and grades:
1. Mixed southern pine or southern pine; No. 2 grade; SPIB.
 2. Spruce-pine-fir (south) or spruce-pine-fir; Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWP.
 3. Western woods; WCLIB or WWP.
- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.6 MISCELLANEOUS PLYWOOD PANELS

- A. General: DOC PS 1, Exposure 1, CD, non-fire-retardant treated and fire-retardant treated as noted below, in thickness indicated or, if not indicated, not less than 5/8-inch nominal thickness.
1. Plywood 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. Plywood blocking and backing panels, non-fire-retardant treated (061000.A19).
 3. Fire-Retardant-Treated Plywood blocking and backing panels (061000.A20).
 - a. Note that plywood equipment backing panels are specified in Article below.
 4. Preservative Treated Plywood blocking and backing panels, non-fire-retardant treated (061000.A22).

2.7 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels (061000.A20): Plywood, DOC PS 1, Exterior, A-C, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.
1. Plywood 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."

2.8 FASTENERS

- A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.
1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
 2. Where rough carpentry is preservative treated or fire-retardant-treated wood materials, provide Type 304 stainless steel fasteners or fasteners with corrosion-protective coating have a salt-spray resistance of more than 800 hours according to ASTM B117.
- B. Nails, Brads, and Staples: ASTM F 1667.

- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC58 or ICC-ES AC308 as appropriate for the substrate.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
 - 2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.9 MISCELLANEOUS MATERIALS

- A. Flexible Strip Flashing (061000.A24): Provide self-adhering, membrane, 40 mils thick.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated in the work included, but are not limited to, the following:
 - a. Air-Shield by W. R. Meadows, Inc.
 - b. Blueskin by Henry Corp.
 - c. CCW 705 by Carlisle Coatings & Waterproofing.
 - d. Hyload S/A Through Wall Flashing by Hyload, Inc.
- B. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
 - 1. Adhesives shall have a VOC content of 70 g/L or less.
 - 2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- C. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chlorpyrifos as its active ingredient.

PART 3 EXECUTION

3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- D. Install plywood blocking and backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.
- E. Do not splice structural members between supports unless otherwise indicated.
- F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- G. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
 - 2. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.
- H. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are

too small to use with minimum number of joints or optimum joint arrangement.

- I. Comply with AWP A M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- J. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- K. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.10.1, "Fastening Schedule," in ICC's International Building Code.
 - 3. ICC-ES evaluation report for fastener.
- L. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.
- M. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
 - 1. Comply with approved fastener patterns where applicable. Before fastening, mark fastener locations, using a template made of sheet metal, plastic, or cardboard.
 - 2. Use finishing nails unless otherwise indicated. Countersink nail heads and fill holes with wood filler.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Plywood: Install 1-by-3-inch nominal-size furring vertically at 16 inches o.c.
- C. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal-size furring vertically at 16 inches o.c.

3.4 PROTECTION

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

END OF SECTION 061000

SECTION 061600 - SHEATHING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fire Rated plywood sheathing (061600.A02).
 - 2. Plywood Subflooring (061600.A11).
 - 3. Miscellaneous sheathing as indicated for backup to sheet metal flashing, coping, and other applications indicated.
 - 4. Sheathing joint and penetration treatment.
- B. Related Requirements:
 - 1. Section 012200 "Unit Prices" for those unit prices affecting work of this Section.
 - 2. Section 012300 "Alternates" for those alternates affecting work of this Section.
 - 3. Section 061000 "Rough Carpentry" for plywood backing panels.
 - 4. Section 072500 "Weather Barriers" for water-resistive barrier applied over wall sheathing.
 - 5. Section 072726 "Air-Barrier Coatings" for air barrier applied over wall sheathing.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
 - 3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5516.
 - a. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
 - 4. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 - 5. Include data for Structural Concrete Panel including fasteners and panel layout.

1.3 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
 - 1. Wood-preservative-treated plywood.
 - 2. Fire-retardant-treated plywood.

1.4 QUALITY ASSURANCE

- A. Mockups: Build mockups to set quality standards for materials and execution and for preconstruction testing.
 - 1. Build integrated mockups of exterior wall assembly as indicated on Drawings, incorporating backup wall construction, window, storefront, door frame and sill, ties and other penetrations, and flashing to demonstrate crack and joint treatment and sealing of gaps, terminations, and penetrations of air-barrier sheathing assembly.
 - a. Coordinate construction of mockups to permit inspection and testing of sheathing before external insulation and cladding are installed.
 - b. Include junction with roofing membrane, building corner condition, and foundation wall intersection.
 - c. If Architect determines mockups do not comply with requirements, reconstruct mockups until mockups are approved.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- B. Testing Agency Qualifications:
1. 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.
 2. For testing and inspecting agency providing tests and inspections related to air-barrier and water-resistant glass-mat gypsum sheathing: an independent agency, qualified according to ASTM E329 for testing indicated, and certified by Air Barrier Association of America, Inc.
 - a. **[ONLY FOR AIR BARRIER COMBO SHEATHING]**

1.5 DELIVERY, STORAGE, AND HANDLING

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

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

2.2 WOOD PANEL PRODUCTS - GENERAL

- A. Plywood: DOC PS1.
1. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
 2. Factory mark panels to indicate compliance with applicable standard.

2.3 FIRE-RETARDANT-TREATED PLYWOOD

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
1. Use treatment that does not promote corrosion of metal fasteners.
 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201/D3201M at 92 percent relative humidity. Use where exterior type is not indicated.
 4. Design Value Adjustment Factors: Treated lumber plywood shall be tested according to ASTM D5516 and design value adjustment factors shall be calculated according to ASTM D6305. Span ratings after treatment shall be not less than span ratings specified. For roof sheathing and where high-temperature fire-retardant treatment is indicated, span ratings for temperatures up to 170 deg F (76 deg C) shall be not less than span ratings specified.
- C. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.

- D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.
- E. Application: Treat plywood indicated on Drawings, and the following:
 - 1. Roof and wall sheathing within 48 inches (1220 mm) of fire party walls.
 - 2. Wall sheathing.
 - 3. Roof sheathing.
 - 4. Subflooring and underlayment for raised platforms.
 - 5. Back side of parapets where indicated.

2.4 WALL SHEATHING

- A. Fire Retardant Treated Plywood Wall Sheathing: (061600.A02)
 - 1. Span Rating: Not less than 16/0.
 - 2. Nominal Thickness: Unless specifically indicated otherwise, not less than 5/8 inch, except 3/4 inch at back sides of parapets.
 - 3. Size: 48 by 96 inches or as required for vertical installation without butt joints.

2.5 FLOOR SHEATHING

- A. **[[ADDED FOR LEMAN - WOOD CONSTRUCTION]]**
- B. Oriented-Strand-Board Sheathing: DOC PS 2, Exposure 1, Structural I.
 - 1. Span Rating: Not less than 40/30.
 - 2. Nominal Thickness: Not less than 15/32 inch (11.9 mm) or unless otherwise indicated on Drawings.

2.6 SUBFLOORING AND UNDERLAYMENT

- A. Plywood Subflooring (061600.A11): Exposure 1 single-floor panels or sheathing.
 - 1. Nominal Thickness: Not less than 3/4 inch.
 - 2. Provide fire retardant treated plywood at subfloor and vertical wall conditions.
 - 3. At vertical wall conditions, provide fire retardant treated plywood with a thickness of 5/8 inches.
- B. Underlayment (061600.A12): Provide underlayment in nominal thicknesses indicated or, if not indicated, not less than 1/4 inch over smooth subfloors and not less than 3/8 inch overboard or uneven subfloors.
 - 1. Plywood Underlayment for Resilient Flooring: DOC PS 1, Exterior A-C with fully sanded face.
 - 2. Plywood Underlayment for Ceramic Tile: DOC PS 1, Exterior, C-C Plugged, not less than 5/8-inch nominal thickness.
 - 3. Plywood Underlayment for Carpet: DOC PS 1, Exposure 1, Underlayment.

2.7 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. For roof and parapet sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
 - 2. For wall sheathing, provide fasteners with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Screws for Fastening Sheathing to Wood Framing: ASTM C 1002.
- E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

- F. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
 - 1. For steel framing less than 0.0329 inch thick, use screws that comply with ASTM C 1002.
 - 2. For steel framing from 0.033 to 0.112 inch thick, use screws that comply with ASTM C 954.

PART 3 EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
 - 2. ICC-ES evaluation report for fastener.
- D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

END OF SECTION 061600

SECTION 062023 - INTERIOR FINISH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior trim with transparent finish (062023.A01).
 - 2. Interior molding with transparent finish (062023.A03).
 - 3. Wood Railings (062023.A14).
- B. Related Requirements:
 - 1. Section 064023 "Interior Architectural Woodwork" for custom casework and custom trim/molding.
 - 2. Section 061000 "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view.
 - 3. Section 099123 "Interior Painting" for priming and backpriming of interior finish carpentry.
 - 4. Section 099300 "Staining and Transparent Finishing".

1.2 DEFINITIONS

- A. MDF: Medium-density fiberboard.
- B. MDO: Plywood with a medium-density overlay on the face.
- C. PVC: Polyvinyl chloride.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.
 - 1. 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 and net amount of preservative retained. Include chemical-treatment manufacturer's written instructions for finishing treated material.
 - 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.
- B. Samples: For each exposed product and for each color and texture specified.
- C. Samples for Initial Selection: For each type of product involving selection of colors, profiles, or textures.
- D. Samples for Verification:
 - 1. For each species and cut of lumber and panel products with nonfactory-applied finish, with half of exposed surface finished; 24 sq. in. for lumber and 8 by 10 inches for panels.
 - 2. For foam-plastic moldings, with half of exposed surface finished; 50 sq. in.
 - 3. For each finish system and color of lumber and panel products with factory-applied finish, 50 sq. in. for lumber and 8 by 10 inches for panels.
 - 4. For each species and cut of trim and molding profile with non-factory-applied finish, with 1/2 of exposed surface finished for each molding profile and one trim profile. Samples shall be at least 8 inches long.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation.
 - 1. Protect materials from weather by covering with waterproof sheeting, securely anchored.
 - 2. Provide for air circulation around stacks and under coverings.
- B. Deliver interior finish carpentry materials only when environmental conditions comply with requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only

where environmental conditions comply with requirements specified for installation areas.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet-work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 1 PRODUCTS

2.1 MATERIALS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with applicable rules of any rules-writing agency certified by the American Lumber Standard Committee's (ALSC) Board of Review. Grade lumber by an agency certified by the ALSC's Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by grading agency.
 - 3. Grading Agencies and Rules:
 - a. NeLMA: Northeastern Lumber Manufacturers' Association, "Standard Grading Rules for Northeastern Lumber."
 - b. NHLA: National Hardwood Lumber Association, "Rules for the Measurement and Inspection of Hardwood & Cypress."
 - c. NLGA: National Lumber Grades Authority, "Standard Grading Rules for Canadian Lumber."
 - d. SPIB: The Southern Pine Inspection Bureau, "Standard Grading Rules for Southern Pine Lumber."
 - e. WCLIB: West Coast Lumber Inspection Bureau, Standard No. 17, "Grading Rules for West Coast Lumber."
 - f. WWPAA: Western Wood Products Association, "Western Lumber Grading Rules."
- B. Softwood Plywood: DOC PS 1.
- C. Hardboard: ANSI A135.4.
- D. MDF: ANSI A208.2, Grade 130, made with binder containing no urea-formaldehyde resin.
- E. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea-formaldehyde resin.
- F. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3.
 - 1. Refer to Drawings for laminate selections.
 - a. Comparable products from other manufacturers will be considered which match colors and patterns to Architect's satisfaction (submit samples) and which are submitted to and accepted by Architect prior to bidding.
- G. Melamine-Faced Particleboard: Particleboard complying with ANSI A208.1, Grade M-2, finished on both faces with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.
 - 1. Colors: As selected by Architect from manufacturer's full range.

2.2 INTERIOR TRIM

- A. Hardwood Lumber Trim for Transparent Finish (Clear Finish) (062023.A01):
 - 1. Species and Grade: Red Oak, Grade A, Rift cut. Stained to match Architect's sample.

2. Maximum Moisture Content: 13 percent.
 3. Finger Jointing: Not allowed.
 4. Gluing for Width: Use for lumber trim wider than 6 inches.
 5. Veneered Material: Not allowed.
 6. Face Surface: Surfaced (smooth).
 7. Matching: Selected for compatible grain and color.
 8. Profiles: Refer to Drawings and Material Finish Legend for configurations and profiles required.
 9. Wide Profiles: Biscuit join any profiles with widths wider than standard dimensional lumber..
- B. Hardwood Moldings for Transparent Finish (Clear Finish) (062023.A03): MMPA WM 4, N-grade wood moldings made to patterns included in MMPA's "HWM/Series Hardwood Molding Patterns."
1. Basis-of-Design: Provide mouldings by Horner Millwork or comparable product meeting specified requirements and approved by Architect prior to bidding.
 2. Species: As selected by Architect.
 3. Cut: Rift cut.
 4. Maximum Moisture Content: 9 percent.
 5. Finger Jointing: Not allowed.
 6. Matching: Selected for compatible grain and color.
 7. Grain: Run in consistent vertical direction.
 8. Base Pattern: Refer to the drawings.
 9. Profiles: Refer to Drawings and Material Finish Legend for configurations and profiles required.
 10. Wide Profiles: Biscuit join any profiles with widths wider than standard dimensional lumber..
- C. Wood Railings (062023.A14): Materials used shall adhere to the requirements set forth in the AWI 300 - Materials Standard (latest edition).
1. Species: Red Oak
 2. Grade: Custom
 3. Rail Size and Profile: As indicated on Drawings.
 4. Straight Handrails:
 - a. Handrails shall be laminated to endure straightness.
 - b. Glue lines from horizontal plys shall not be visible from the top view of rail.
 - c. All visible plys shall be same species and grade.
 - d. Top rail ply not exceeding 140 inches long shall be solid.
 - e. One staggered joint is permitted at the top rail ply exceeding 140 inches.
 - f. Finger joints permitted at lower plys only.
 - g. Plys shall be compatible for color.
 5. Rail and Fitting connections shall be of same species and joined with glue and concealed hardware.
 6. Fittings:
 - a. Finger Jointing: Not allowed.
 - b. Furnish in such sections to avoid pronounced cross grain and reduce joints to a minimum.
 - c. Miter joints are permitted at fittings turning over 45 degrees.
 - d. Easings shall have ply thickness to prevent exposure of glue lines at top of rail.
 - e. Wreathed transition shall have minimum of 34.9 mm (1.375 inch) thick plys.
 7. Matching: Selected for compatible grain and color.
 8. Profiles:
 - a. Shape rail as required to receive continuous steel bar for attachment, as indicated on Drawings.

2.3 MISCELLANEOUS MATERIALS

- A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.
- B. Low-Emitting Materials: Adhesives shall comply with testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- C. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
- D. Multipurpose Construction Adhesive: Formulation, complying with ASTM D3498, that is recommended for indicated use by adhesive manufacturer.

2.4 FABRICATION

- A. Back out or kerf backs of the following members, except those with ends exposed in finished work:
 - 1. Interior standing and running trim, except shoe and crown molds.
 - 2. Wood-board paneling.
- B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.
- B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.3 INSTALLATION, GENERAL

- A. Do not use materials that are unsound; warped; improperly treated or finished; inadequately seasoned; too small to fabricate with proper jointing arrangements; or with defective surfaces, sizes, or patterns.
- B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials.
 - 1. Use concealed shims where necessary for alignment.
 - 2. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
 - 3. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated. Coordinate specific fastening hardware and requirements with Drawings.
 - 4. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
 - 5. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.4 STANDING AND RUNNING TRIM INSTALLATION

- A. Install trim with minimum number of joints as is practical, using full-length pieces from maximum lengths of lumber available.
 - 1. Do not use pieces less than 24 inches long, except where necessary.
 - 2. Stagger joints in adjacent and related standing and running trim.
 - 3. Cope at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint.
 - 4. Use scarf joints for end-to-end joints.
 - 5. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.
 - 6. Match color and grain pattern of trim for transparent finish (stain or clear finish) across joints.
 - 7. Install trim after gypsum-board joint finishing operations are completed.

8. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting.
9. Fasten to prevent movement or warping.
10. Countersink fastener heads on exposed carpentry work and fill holes.

3.5 ADJUSTING

- A. Replace interior finish carpentry that is damaged or does not comply with requirements.
 1. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.
- B. Adjust joinery for uniform appearance.

3.6 CLEANING

- A. Clean interior finish carpentry on exposed and semiexposed surfaces.
- B. Restore damaged or soiled areas and touch up factory-applied finishes if any.

3.7 PROTECTION

- A. Protect installed products from damage from weather and other causes during construction.
- B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.
 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 062023

This page intentionally left blank

SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Ornamental wood trim – transparent finish (064023.A01-WD4).
 - 2. Interior veneered plywood (064023.A07 – WD5).
 - 3. Ornamental Woodwork (064023.A13 - WT-1)
 - 4. Metal Edge Trim (064023.A24).
 - 5. Swinging Display Case Door System (064023.A25).
 - 6. Display case shelving systems (064023.A27).
 - 7. Concealed Countertop Bracket (064023.A32).
 - 8. Exposed Countertop Bracket (064023.A33).
- B. Related Sections include the following:
 - 1. Section 055000 "Metal Fabrications" for decorative metal finished components.
 - 2. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.
 - 3. Section 062023 "Interior Finish Carpentry" for premanufactured wood trim and shelving.
 - 4. Section 088000 "Glazing" for glass for display case doors and shelves.
 - 5. Section 092900 "Gypsum Board" for decorative metal reveals.
 - 6. Section 101400 "Signage" for fabricated signage items.
 - 7. Section 123200 "Manufactured Wood Casework" for premanufactured casework.
 - 8. Section 123666 "Solid Surfacing Countertops" for solid surfacing countertops.

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. Balanced Construction: Where exposed face of a panel is surfaced with high pressure plastic laminate and the opposite (back) surface shall receive a cabinet liner or backer sheet when that surface is not exposed to view.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated, including hardware, accessories and solid-surfacing material.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 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 items installed in architectural woodwork.
- C. Samples for Initial Selection: For each type of product involving selection of colors, profiles, or textures.
- D. Samples for Verification:
 - 1. For each species and cut of lumber and wood trim with non-factory-applied finish, with 1/2 of exposed surface finished, 50 sq. in. for lumber and 10-inch-long for trim.
 - 2. Veneer-faced panel products with transparent finish, with 1/2 of exposed surface finished, 8 by 10 inches for each species and cut of veneered panel. Include at least one face-veneer seam and finish as specified.
 - 3. Exposed cabinet hardware and accessories, one unit for each type.
 - 4. Solid-surfacing materials, 6 inches square.
 - 5. Display case door rail finish, 4 inches long.
 - 6. Display case brackets and standards, not less than 4 inches long.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of product, signed by product manufacturer.
- B. Qualification Data: For Installer.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance of not less than seven years under the current company name.
- B. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- C. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork with sequence-matched wood veneers and plastic laminate finishes.
- D. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
 - 1. Comply with "Premium" grading requirements, unless specifically specified otherwise.
- E. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, 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. Preinstallation Conference: Conduct conference at Project site.

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.
- B. Stack lumber, trim, plywood, and other panels flat with spacers between each bundle to provide air circulation. Protect materials from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

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. Do not install interior architectural woodwork materials that are wet, moisture damaged, or mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.
- C. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.

2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

1.9 WARRANTY

- A. Special Warranty for Hardware: Manufacturer's standard from in which manufacturer agrees to repair or replace components that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Failure of operating hardware.
 - b. Deterioration of finishes.
 2. Warranty period: Three years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MATERIALS

- A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Wood Species and Cut for Transparent Finish: Red Oak, plain sliced/plain sawn. Refer to Material Finish Legend and Drawings for addition information and locations.
- C. Wood Products: Comply with the following:
 1. Hardboard: AHA A135.4.
 2. Medium-Density Fiberboard: ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde.
 - a. Where Fire Retardant MDF or FRT MDF is indicated, MDF must meet class A requirements per ASTM E 84.
 3. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
 4. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1, made with adhesive containing no urea formaldehyde.
- D. Tempered Float Glass for Display Case Doors and Shelves: Refer to Section 088000 for requirements.
- E. Curved Wood Products: Subject to compliance with requirements, provide "Kerfkore" by Kerfore or a comparable product by another manufacturer meeting the requirements for wood products as specified by the work of this section.

2.2 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this Article, 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 AWPA C20 (lumber) and AWPA C27 (plywood). Use the following treatment type:

1. Interior Type A: Low-hygroscopic formulation.
2. Kiln-dry materials before and after treatment to levels required for untreated materials.

2.3 INTERIOR WOOD TRIM – TRANSPARENT (064023.A01)

- A. Hardwood Lumber Trim for Transparent Finish (064023.A01-WD4): Comply with AWI, Section 300, Grade "Custom".
 1. Species and Grade: Red Oak, Rift Sawn – Stained to match Architect Sample as indicated on Material Finish Legend.
 2. Maximum Moisture Content: 13 percent.
 3. Finger Jointing: Not allowed.
 4. Gluing for Width: Use for lumber trim wider than 6 inches.
 5. Veneered Material: Not allowed.
 6. Face Surface: Surfaced (smooth).
 7. Matching: Selected for compatible grain and color.
 8. Profiles: Refer to Drawings for configurations and profiles required.
- B. Hardwood Moldings for Transparent Finish (064023.A13 - WT-1): WMMPA HWM 2, N-grade wood moldings made to patterns included in WMMPA HWM 1.
 1. Species and Grade: Rift Sawn Red Oak – Stained to match Architect Sample as indicated on Material Finish Legend.
 2. Maximum Moisture Content: 9 percent.
 3. Finger Jointing: Not allowed.
 4. Matching: Selected for compatible grain and color.
 5. Profiles: Refer to Drawings for configurations and profiles required.

2.4 INTERIOR VENEERED PLYWOOD (064023.A07)

- A. Hardwood Veneer Plywood (064023.A07 – Type WD5) : Manufacturer's stock hardwood plywood panels complying with HPVA HP-1, made without urea-formaldehyde adhesive.
 1. AWI Grade: Premium.
 2. Face Veneer Species and Cut:
 - a. Provide Rift Sawn Red Oak where indicated on Material Finish Legend, stain to match color indicated.
 3. Veneer Matching of Veneer Leaves: Bookmatch and end match.
 4. Veneer Matching within Panel Face: Center-balance match.
 5. Construction: Veneer core, APA Marine grade plywood.
 6. Thickness: 0.75 inch, unless otherwise indicated.
 7. Panel Size: 48 by 96 inches or greater.
 8. Glue Bond: Type II (interior).
 9. Finish: Field finished by others.
 10. Joints: Provide biscuit joinery at all flush panel joints.
 11. Provide veneer edgebanding where plywood edges are indicated to be exposed.
 - a. Refer to Section 099300 "Staining and Transparent Finishing" for fire-retardant, vertical non-traffic finishing system.
- B. Custom Stainless Steel Corner Trim: Provide custom fabricated corner trim fabricated from 18 gauge, Type 304 stainless steel sheets. Trim shall be formed from a single sheet to profiles indicated on Drawings.
- C. Z-Clips for Mechanically Fastened Interior Veneered Plywood: Subject to compliance with requirements, provide "MF375 Clip" by Monarch or comparable product with the following product characteristics, submitted to and accepted by Architect prior to bidding:
 1. Material: 6063-T6 Aluminum.
 2. Projection from Substrate: 1/4 inch.
 3. Lift Off Distance/Engagement Length: 3/8 inch.
 4. Length of Clip: 2 inch minimum to 72 inches maximum.
 - a. Provide clips in lengths as required to meet performance requirements.
 5. Installation: Mechanically fastened using manufacturer's recommended fasteners.

2.5 METAL EDGE TRIM (064023.A24)

- A. Millwork Reveal Base (064023.A24): Subject to compliance with requirements, provide "4 inch Millwork Reveal Base - Model No. MWRB75400" by Fry Reglet Corporation or comparable product with the following product characteristics, submitted to and accepted by Architect prior to bidding:
1. Material: 6063-T5 Aluminum.
 2. Finish: Clear anodized.
 3. Projection from Substrate: 1/4 inch.
 4. Installed with 3/4 inch millwork panels at base of panels.
 5. Provide clips in lengths as required to meet performance requirements.
 6. Installation: Mechanically fastened using manufacturer's recommended fasteners.
- B. Z-cleats for Mechanically Fastened Interior Panels: Subject to compliance with requirements, provide comparable product with the following product characteristics, submitted to and accepted by Architect prior to bidding:
1. Material: 6063-T6 Aluminum.
 2. Depth: 1/4 inch.
 3. Length of Cleat: 2 inch minimum to 72 inches maximum.
 - a. Provide cleats in lengths as required to meet performance requirements.
 4. Installation: Mechanically fastened using manufacturer's recommended fasteners.

2.6 CABINET HARDWARE AND ACCESSORIES

- A. Concealed Countertop Bracket (064023.A32) – Basis-of-Design Product: Subject to compliance with requirements, provide the "Concealed Flat Bracket - C-Flat 2.0" by A&M Hardware, Inc., steel thickness and dimensions shall be sized to support carrying capacity. Comparable products will be considered when submitted to and accepted by Architect prior to bidding.
1. Carrying capacity shall not be less than 1000 lbs, accommodating a counter depth of at least 25 inches.
 2. Coordinate solid wood blocking requirements for a concealed bracket installation prior to installation of drywall.
 3. Include upper extension as required.
 4. Color: As selected from manufacturers full range.
 5. Sizes: As determined by countertop size.
 6. Spacing: 24" on center.
- B. Exposed Countertop Bracket (064023.A33) – Basis-of-Design Product: Subject to compliance with requirements, provide A&M Hardware, Inc., "Hybrid Bracket, HYB-1.5" without upper extension. Length of support arm varies, refer to Drawings. Color to be selected by Architect from manufacturer's full range of colors. Final color as indicated on drawings. Carrying capacity shall not be less than 450 lbs, accommodating a counter depth of at least 25 inches. Comparable products will be considered when submitted to and accepted by Architect prior to bidding.
1. Coordinate solid wood blocking requirements for a concealed bracket installation prior to Installation of drywall.
 2. Color: As selected from manufacturers full range.
 3. Sizes: As determined by countertop size.
 4. Spacing: 24" on center.

2.7 SWINGING DISPLAY CASE DOOR SYSTEM (064023.A25)

- A. Display Case Doors - Basis-of-Design Product: Subject to compliance with requirements, provide Blumcraft of Pittsburgh / C.R. Laurence Co, Inc.; "Series 1301-SM" Display Case Door System or comparable product from other manufacturers submitted to and accepted by Architect prior to bidding.
1. System Description: System shall include, but not be limited to: manual-swinging display case doors with top and bottom rails: Rail types shall be square type with top and bottom trim. Furnish as complete units with: locks, strike plate and other accessories necessary for complete and fully-functional installation.
 - a. Refer to Section 088000 for glass requirements; glass to be provided by display case door hardware installer.
 - b. Exposed aluminum surfaces shall have a clear satin anodized finish.

2.8 DISPLAY CASE SHELVING SYSTEM (064023.A27)

- A. Display Case Shelf Standards and Brackets: Subject to compliance with requirements, provide the following display case shelving, including all accessories and fasteners, or comparable products from other manufacturers, submitted to and accepted by Architect prior to bidding.
 - 1. Display Case Shelving:
 - a. Basis-of-Design Product: Doug Mockett & Company, Inc.; "SH15 Series", Model SH15C.
 - b. Standards/Track: Architect will select from any of the two track (standard) styles. Tracks shall be single slotted type, fabricated from aluminum. Factory finish in satin finish.
 - c. Brackets: Brackets shall be rectangular shape, ¼ inch wide and 1-1/4 inch high, similar to EZ Shelf Support Bracket. Bracket lengths shall be 11-11/16 inch, unless another length is indicated on Drawings. Brackets shall be fabricated from aluminum and shall be clear satin finished to match standards/tracks. Provide bracket lengths to suit shelving depths indicated.
 - d. Accessories include, but are not limited to: Manufacturer's standard hold-down brackets, clear rubber bumper supports for glass shelves and fasteners to suit supporting substrate. Fasteners shall be finished to match standards/tracks.
 - e. Glass Shelves: Refer to Section 088000 for requirements.

2.9 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide 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: Use adhesives that meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- D. Installation Adhesive: Product recommended by fabricator for each substrate for secure anchorage.
 - 1. Adhesives shall have a VOC content of 70 g/L or less.
 - 2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.10 FABRICATION, GENERAL

- A. 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.
- B. 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 Inch Thick or Less: 1/16 inch.
 - 2. Edges of Rails and Similar Members More Than 3/4 Inch Thick: 1/8 inch.
- C. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 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.
- D. 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.

- E. 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.
- F. Install glass in display case doors in accordance with door manufacturer's instructions.
- G. Apply marker board laminate to flush wood doors on the non-primed face, in strict accordance with laminate manufacturer's written recommendations.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine all areas and conditions where solid surfacing fabrications will be installed. Notify Architect of any conditions that would adversely affect the installation. Do not proceed with installation until unsatisfactory conditions are corrected.
 - 1. Commencement of installation is construed as acceptance of the adjacent surfaces and conditions.

3.2 PREPARATION

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

3.3 INSTALLATION

- A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.
- B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.
- C. 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 inch in 96 inches.
- D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Preservative-Treated Wood: Where cut or drilled in field, treat cut ends and drilled holes according to AWP A M4.
- F. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.
- G. 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.
- H. Display Case Doors and Shelving: Install units plumb and level in strict accordance with manufacturer's written instructions. Check doors for proper operation and adjust as necessary. Install shelf hanging systems to configurations indicated and in accordance with manufacturer's written instructions.

3.4 STANDING AND RUNNING TRIM INSTALLATION

- A. Install with minimum of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary. Stagger joints in adjacent and related standing and running trim. Miter at returns, miter at outside corners, and cope at inside corners to produce tight fitting joints with full-surface contact throughout length of joint. Use scarf joints to end-to end joints. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.

1. Match Color and grain pattern of trim for transparent finish (stain or clear finish) across joints.
2. Install trim after gypsum board joint finishing operations are completed.
3. Install without splitting; drill pilot holes before fastening where necessary to prevent spitting. Fasten to prevent movement of warping. Countersink fastener heads on exposed carpentry work and fill holes.
4. Hardwood Flush Siding Installation Requirements:
 - a. Machine nail hardwood siding to plywood with 1-3/4 inch barbed cleats or equivalent fastening with end joints properly driven up and with proper spacing to suit humidity conditions at Project. Space fasteners at 12 inch centers maximum.
 - b. Installation tolerances: 1/8 inch in 10 feet of variance from level.

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.
- D. Stainless Steel Protection: Provide 6-mil plastic or other suitable water-resistant covering over the countertop surfaces. Tape to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.

END OF SECTION 064023

SECTION 066400 - PLASTIC PANELING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Plastic sheet paneling (066400.A01)
- B. Related Requirements:
 - 1. Section 061000 "Rough Carpentry" for wood furring for installing plastic paneling.
 - 2. Section 102600 "Wall and Door Protection" for corner guards installed over plastic paneling.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For plastic paneling and trim accessories, in manufacturer's standard sizes.

1.3 QUALITY ASSURANCE

- A. Testing Agency: Acceptable to authorities having jurisdiction.

1.4 PROJECT CONDITIONS

- A. 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.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain plastic paneling and trim accessories from single manufacturer.

2.2 PLASTIC SHEET PANELING (066400.A01)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Marlite; "Standard FRP Panels", or comparable product, meeting specified requirements, submitted to and accepted by Architect prior to bidding.
- B. Glass-Fiber-Reinforced Plastic Paneling (066400.A01): Gelcoat-finished, glass-fiber-reinforced plastic panels complying with ASTM D 5319. Panels shall be USDA accepted for incidental food contact.
 - 1. Wall materials shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
 - 2. Surface-Burning Characteristics: As follows when tested by a qualified testing agency according to ASTM E 84. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less (Class A).
 - b. Smoke-Developed Index: 450 or less.
 - 3. Nominal Thickness: Not less than 3/32 inch.
 - 4. Surface Finish: Smooth texture.
 - 5. Color: As selected by Architect from manufacturer's full range.

2.3 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: As selected by Architect from manufacturer's full range.
- B. Exposed Fasteners: Nylon drive rivets recommended by panel manufacturer.
- C. Adhesive: As recommended by plastic paneling manufacturer.
 - 1. Adhesives shall have a VOC content of 50 g/L or less.
- D. Sealant: Mildew-resistant, single-component, neutral-curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Section 079200 "Joint Sealants."
 - 1. Sealant shall have a VOC content of 250 g/L or less.

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 the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrate by sanding high spots and filling low spots as needed to provide flat, even surface for panel installation.
- B. Clean substrates of substances that could impair adhesive bond, including oil, grease, dirt, and dust.
- 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 inches 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.

3.3 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, supplemented with fasteners. Do not fasten through panels.
- 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.

END OF SECTION 066400

SECTION 072100 - THERMAL INSULATION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Polyisocyanurate foam-plastic board (072100.A04).
 - 2. Spray polyurethane foam insulation (072100.A12).
 - 3. Loose-Fill Insulation (072100.A13).
 - 4. Mineral-wool blanket (072100.A17).
- B. Related Requirements:
 - 1. Section 012300 "Alternates" for those alternates affecting work of this Section.
 - 2. Section 033000 "Cast-in-Place Concrete" for foundation insulation and foam void fill.
 - 3. Section 042000 "Unit Masonry" for foamed-in-place masonry cell foam insulation.
 - 4. Section 078446 "Fire-Resistive Joint Systems" for insulation installed as part of a perimeter fire-resistive joint system.
 - 5. Section 092900 "Gypsum Board" for sound attenuation blanket used as acoustic insulation.
- C. Products Furnished but not Installed Under Work of this Section:
 - 1. Cavity-wall insulation.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- B. Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect foam-plastic board insulation as follows:
 - 1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
 - 3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 PRODUCTS

2.1 POLYISOCYANURATE FOAM-PLASTIC BOARD (072100.A04)

- A. Polyisocyanurate Board, Glass-Fiber-Mat Faced: ASTM C 1289, glass-fiber-mat faced, Type II, Class 2, Grade 2. Facers shall be coated.
 - 1. Locations:
 - a. Cavity wall insulation.
 - b. Over metal studs with sheathing as indicated.
 - c. At Kitchen refrigerator/freezer beneath slab.
 - 2. Thicknesses: As indicated on Drawings
 - 3. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
 - 4. Insulation, associated components and adhesives shall be compatible with fluid-applied air barrier coating specified in Section 072726.
 - 5. Manufacturers and Products: Subject to compliance with requirements, provide one of the following products:
 - a. Carlisle Coatings and Waterproofing; "R2+ Matte."
 - b. Firestone Building Products; "Enverge CI."
 - c. Hunter; "Xci CG".
 - d. Atlas; comparable product submitted to and accepted by Architect prior to bidding.

2.2 MINERAL-WOOL INSULATION

- A. Mineral-Wool Blanket, Unfaced (072100.A17): ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
 - 1. Thickness: As indicated on Drawings.
- B. Pre-manufactured Head-of-Wall Mineral Wool Insulation: Meeting same criteria as specified above; manufactured into various shapes and sizes to fill voids between top-of-wall and metal decking.

2.3 SPRAY POLYURETHANE FOAM INSULATION

- A. Closed-Cell Polyurethane Foam Insulation (072100.A12): ASTM C1029, Type II, with maximum flame-spread and smoke-developed indexes of 75 and 450 respectively, per ASTM E84.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Corporation
 - b. Dow Chemical Company (The)
 - c. NCFI; Division of Barnhardt Mfg. Co.
 - d. Icynene "ProSeal".
 - e. Demilec; "Heatlok XT High Lift".
 - 2. Minimum density of 1.5 lb/cu. ft., thermal resistivity of 6.2 deg F x h x sq. ft./Btu x in. at 75 deg. F.
- B. Intumescent Coating over Foam Insulation:
 - 1. Basis of Design: Subject to requirements, provide "DC315 Intumescent Coating" by International Fireproof Technology Inc. or a comparable product submitted to and accepted by Architect prior to bidding.
 - 2. Product must be tested to the criteria of NFPA 286 or UL1715 for a duration of 15-20 minutes by an accredited fire testing facility.

2.4 ACCESSORIES

- A. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.
 - 1. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
 - 2. Adhesives shall be compatible with fluid-applied air barrier coating specified in Section 072729.

3. Adhesives shall have a VOC content of 70 g/L or less.
4. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

PART 3 EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
- E. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 INSTALLATION OF SLAB INSULATION

- A. On horizontal surfaces, loosely lay insulation units in two layers, according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

3.4 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Foam-Plastic Board Insulation: Seal joints between units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.
- C. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
- D. Mineral-Wool Blanket Insulation: Install at tops of non-rated interior walls to fill cavities between top of wall and underside of deck/structure above. Install in parapet walls over runner track as shown. Provide lengths that will produce a snug fit between ends.

- E. Spray-Applied Insulation at Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
 - 1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.
 - 2. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of CMU by using method recommended by insulation manufacturer.
 - 3. Fill voids of joist bearing pockets in exterior walls.
 - 4. Fill voids between double studs at openings in exterior walls.
 - 5. Fill voids between framing members of boxed headers, including header.
 - 6. Fill voids at tops of exterior walls or provide pre-manufactured head-of-wall mineral wool insulation.
 - 7. At raised Platform between framing members for sound deadening.
 - 8. Apply intumescent fireproofing coating over spray applied insulation as recommended by manufacturers of both systems.

3.5 INSTALLATION OF CAVITY-WALL INSULATION

- A. Refer to Section 042000 "Unit Masonry" for additional installation requirements.

3.6 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 072500 - WEATHER BARRIERS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Self-adhering weather barrier (072500.A02).
 - 2. Flexible Flashing (072500.A03).

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. For self-adhering building wrap, include data on air and water-vapor permeance based on testing according to referenced standards.
- B. Shop Drawings: For weather-barrier assemblies.
 - 1. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.

1.3 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For water-resistive barrier, from ICC-ES.
 - 1. Weather resistive barrier shall meet ICC-ES AC38 "Acceptance Criteria for Water Resistive Barriers".

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

PART 2 PRODUCTS

2.1 WATER-RESISTIVE BARRIER (072500.A02).

- A. Basis-of-Design Products: Provide weather resistive barrier as a complete system, including but not limited to; self-adhering building wrap, self-adhering flashing, reinforced liquid flashing, tape and sealants. Subject to compliance with requirements, provide one of the following:
 - 1. VaproShield LLC; "VaproShield WrapShield SA".
 - 2. Henry Company; "BlueskinVP 160".
 - 3. Cosella-Dorken; "Delta-Vent SA".
 - 4. Comparable substitute meeting specified requirements, and which is submitted to and accepted by Architect prior to bidding.
- B. Performance Characteristics:
 - 1. Water-Vapor Permeance: Not less than 29 perms per ASTM E 96/E 96M, Method B.
 - 2. Air Leakage: Not greater than 0.004 CFM/sqft at 1.57 lbs./sqft when tested in accordance with ASTM E2178.
 - 3. Thickness shall not be less than 0.023 inches.
 - 4. Allowable UV Exposure Time: Not less than three months.
 - 5. Fire Performance Characteristics: Class A when tested in accordance with ASTM E 84.

2.2 MISCELLANEOUS MATERIALS

- A. General: Accessory materials recommended by weather-barrier manufacturer to produce a complete assembly and compatible with primary weather-barrier material
- B. Flexible Flashing: Weather resistive barrier manufacturer's standard composite, self-adhesive, flashing product.
- C. Liquid Flashing: Weather resistive barrier manufacturer's standard composite, liquid flashing and reinforcing mesh.
- D. Termination Mastic: Air-barrier manufacturer's standard cold fluid-applied elastomeric liquid; trowel grade.
- E. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.

PART 3 EXECUTION

3.1 EXAMINATION AND SURFACE PREPARATION

- A. General: Examine and prepare surfaces to receive self-adhering building wrap/weather barrier in strict accordance with barrier manufacturer's written instructions, and as follows:
 - 1. All surfaces must be dry, sound, clean and free of oil, grease, dirt, excess mortar and other contaminants detrimental to adhesion of barrier membrane and flashings.
 - 2. Remove fins, ridges, mortar, and other projections.
 - 3. 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.

3.2 WATER-RESISTIVE BARRIER INSTALLATION

- A. General: Install weather-barrier and accessory materials according to manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous weather barrier.
 - 1. Apply flashing (liquid and membrane types) to comply with manufacturer's written instructions.
- B. Where recommended by weather barrier manufacturer, apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by fluid air-barrier material on same day. Reprime areas exposed for more than 24 hours.
 - 1. Where indicated, cover exposed exterior surface of sheathing indicated to receive metal fascia with water-resistive barrier securely adhered to sheathing as occurs. Stagger all end lap seams.
- C. Cover sheathing with water-resistive barrier as follows:
 - 1. Cut back barrier 1/2 inch on each side of the break in supporting members at expansion- or control-joint locations.
 - 2. Apply barrier to cover vertical flashing with a minimum 4-inch overlap.
 - 3. Lap over adjacent construction and adhere to substrate. Cut back weather resistive barrier so it will not be exposed to view and will allow for edge of barrier to be covered with sealant.
 - 4. Install weather barrier and auxiliary materials to lap and seal to adjacent waterproofing and air barrier coating as occurs, to provide continuity of building envelope barrier.
- D. At end of each working day, seal top edge of weather barrier to substrate with termination mastic.
- E. Openings: Prime concealed, perimeter frame surfaces of windows, storefronts, and doors. Apply transitions and flashing (liquid or membrane) so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames with not less than 1 inch of full contact.
- F. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of weather-barrier material with flexible low-rise foam sealant.
- G. Seal top of through-wall flashings to weather barrier. Provide termination bar as recommended by weather barrier manufacturer.

- H. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
- I. Repair punctures, voids, and deficient lapped seams. Slit and flatten fishmouths and blisters. Extend patches 6 inches beyond repaired areas.
- J. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.3 FLEXIBLE FLASHING INSTALLATION

- A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.
 - 1. Prime substrates as recommended by flashing manufacturer.
 - 2. Lap seams and junctures with other materials at least 4 inches except that at flashing flanges of other construction, laps need not exceed flange width.
 - 3. Lap flashing over water-resistive barrier at bottom and sides of openings.
 - 4. Lap water-resistive barrier over flashing at heads of openings.
 - 5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

END OF SECTION 072500

This page intentionally left blank

SECTION 072726 - FLUID APPLIED AIR BARRIER COATINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Vapor-retarding, fluid-applied air barriers (072726.A01).
 - 2. Transition (Detail) Membrane (072726.A03).
- B. Related Requirements:
 - 1. Section 042000 "Unit Masonry" for masonry to receive air barriers.
 - 2. Section 076200 "Sheet Metal Flashing and Trim" for flexible membrane closures installed with air barriers.

1.2 DEFINITIONS

- A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.
- B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.
- C. Air-Barrier Assembly: The collection of air-barrier materials and accessory materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.3 PREINSTALLATION MEETINGS

- A. Pre-Installation Conference: Conduct conference at Project site.
 - 1. Contractor to organize and convene conference a minimum of two weeks prior to commencing Work of this Section.
 - 2. Agenda shall include, at a minimum, the following:
 - a. Construction and visual inspection of mock-up.
 - b. Sequence of construction.
 - c. Coordination with substrate preparation.
 - d. Materials approved for use.
 - e. Compatibility of materials.
 - f. Coordination with installation of adjacent and covering materials.
 - g. Details of construction.
 - h. Review of inspection, testing, protection and repair procedures
 - i. Construction site safety will be discussed to review hazards or fire risks during application.
 - 3. Attendance is required by air barrier coating manufacturer's representative, air barrier coating installer, representatives of related trades including covering materials, substrate materials and adjacent materials.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; tested physical and performance properties of products.
 - 2. Include verification data, including graphic illustrations, listing each component of the assembly passing NFPA 285 testing.
 - 3. Submit product data for air barrier coatings concurrently with product data for polyisocyanurate insulation.
- B. Shop Drawings: For air-barrier assemblies.
 - 1. Show locations and extent of air barrier. Include details for each type of substrate showing: substrate joints and cracks, through-wall flashing, counterflashing, each type of penetration, inside and outside corners, terminations, expansion joints, air barrier flashing system at openings and tie-ins with adjoining construction.
 - 2. Include details of interfaces with other materials that form part of air barrier.

3. Show and list each component of the assembly.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer. Include list of manufacturer-certified installers and supervisors employed by the Installer, who work on Project, in addition to the following:
 1. Submit in writing, evidence of experience.
- B. 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.
- C. Product test reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for air barriers, submit certified test report showing compliance with requirements specified for ASTM E2178.

1.6 QUALITY ASSURANCE

- A. Manufacturer: Air barrier systems shall be manufactured and marketed by a firm with a minimum of 20 years experience in the production and sales of waterproofing. Manufacturers proposed for use, but not named in these specifications shall submit evidence of ability to meet all requirements specified and include a list of projects of similar design and complexity completed within the past five years.
- B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer, in addition to the following:
 1. Installer shall have not less than 5 years' successful experience, under the current company name, in installing fluid-applied membrane air barriers of similar type, size and complexity as those specified for this Project.
 2. Installer shall submit a reference list, complete with Owner, Architect, General Contractor or Construction Manager; phone number of each, of at least seven (7) completed projects in the states of Missouri and Kansas similar in size and specification.
 - a. List shall include square footage installed on each project.
 - b. List shall include type of air barrier installed, name of product installed and name of manufacturer.
 3. Installer shall assign experienced mechanics from previous applications, including lead mechanic/supervisor, for this Project.
- C. Field Mockups: Build mockups to set quality standards for materials and execution.
 1. Apply air barrier coating to mockup panels specified in Section 042000 "Unit Masonry", to demonstrate surface preparation, crack and joint treatment, application of air barriers and associated flashing and transitions, and sealing of gaps, terminations, ties-ins and terminations at openings, and penetrations of air-barrier assembly.
 2. Coordinate application to mockups to permit inspection by Architect and air barrier coating manufacturer's representative of air barrier before external insulation and cladding are installed.
 - a. Include junction building corner condition, building expansion joint and sheet metal flashing.
 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
- D. Testing Agency: Contractor shall engage an independent testing agency to perform testing as indicated in the work of this Section.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- B. Protect stored materials from direct sunlight.
- C. Deliver materials and products in labeled packages. Store and handle in strict compliance with manufacturer's instructions, recommendations, and material safety data sheets. Protect from damage from sunlight, weather, excessive temperatures, and construction operations. Remove damaged material from the site and dispose of in accordance with applicable regulations.

- D. Do not double-stack pallets of fluid applied membrane components on the job site. Provide cover on top and all sides, allowing for adequate ventilation.
- E. Protect fluid-applied membrane components from freezing and extreme heat.
- F. Sequence deliveries to avoid delays but minimize on-site storage.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air-barrier manufacturer.
 - 1. Protect substrates from environmental conditions that affect air-barrier performance.
 - 2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.
 - 3. Do not apply product or accessories over incompatible materials.

1.9 WARRANTY

- A. Material Warranty: Manufacturer's standard form in which manufacturer agrees to replace fluid-applied air barrier membrane materials that fail within specified warranty period when installed and used in strict conformance with written manufacturer's instructions.
 - 1. Failures for non-permeable air barrier system include, but are not limited to, the following:
 - a. Failure to maintain air permeance rating not to exceed 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference: ASTM E 2178, within specified warranty period.
 - b. Failure to maintain a vapor permeance rating no greater than 1 perms when tested in accordance with ATM E96, Method B.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MATERIALS – GENERAL

- A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.
 - 1. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
- B. VOC Content: 100 g/L or less.
- C. Low-Emitting Materials: Products shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 PERFORMANCE REQUIREMENTS

- A. Vapor Retarding Fluid-Applied Air Barrier - General: Air barrier shall be capable of performing as a continuous vapor-retarding air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
- B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft., when tested according to ASTM E 2357.
- C. Exterior wall assemblies incorporating the product and accessories shall be tested in accordance with and comply with the acceptance criteria of NFPA 285.
- D. Air barrier system shall be tested for various fastener attached penetrations including, but not limited to, veneer anchors.

- E. The air barrier shall be joined in an airtight and flexible manner to the air barrier material of adjacent systems, allowing for the relative movement of systems due to thermal and moisture variations and creep. Connection shall be made between:
 - 1. Foundation and walls.
 - 2. Walls and windows or doors.
 - 3. Different wall systems.
 - 4. Wall and roof.
 - 5. Wall and roof 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.
- F. All penetrations of the air barrier and paths of air infiltration/exfiltration shall be made airtight.

2.3 VAPOR-RETARDING FLUID-APPLIED AIR BARRIER

- A. Fluid-Applied, Vapor-Retarding Membrane Air Barrier (072726.A01): Fire- resistant, synthetic polymer membrane.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Carlisle Coatings and Waterproofing (CCW); "Fire-Resist BarriTech NP."
 - b. Henry Corporation; "Air-Bloc 32 MR."
 - c. W. R. Meadows; "Air-Shield LSR."
 - d. Tremco; "ExoAir 130."
 - e. Comparable products from other manufacturers meeting specified requirements, and that are submitted to and accepted by Architect prior to bidding.
 - 2. Physical and Performance Properties:
 - a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.
 - b. Water Vapor Permeance: Maximum 1 perm; ASTM E 96/E 96M (Method B).
 - c. Ultimate Elongation: Minimum 346 percent; ASTM D412, Die C.
 - d. Surface Burning Characteristics:
 - 1) Flame Spread Index of 25 or less; ASTM E 84.
 - 2) Smoke Generation Index of 450 or less; ASTM E 84.
 - e. Low Temperature Flexibility: No cracking at minus 20 degrees F, 180-degree bend over 1-inch mandrel.
 - f. Fastener Sealability: No water leaking through nail penetration after 24 hours; ASTM D 1970.
 - 1) System shall be coordinated and tested with installation requirements of veneer anchors and other attachments over air barrier system.
 - g. UV Exposure Rating: Coating may be exposed up to 180 days (6 months) without effecting warranty.
 - h. Multi-Story Fire Tests: Air barrier coating shall pass NFPA 285.

2.4 ACCESSORY MATERIALS

- A. General: Accessory materials recommended by air-barrier manufacturer to produce a complete fire-resistant air-barrier assembly and compatible with primary air-barrier material.
- B. Transition Membrane and Flashing (072726.A03): Provide self-adhering sheet or reinforced liquid flashing as recommended by air-barrier material manufacturer. Approved with air barrier membrane in NFPA 285 wall assemblies.
 - 1. Basis-of-Design Products for Transition Membrane: Subject to compliance with requirements, provide one of the following:
 - a. Carlisle Coatings and Waterproofing; "CCW Sure-Seal Pressure-Sensitive Elastoform".
 - 1) SELF-ADHERING SHEET - PRODUCT INFO: Fully-adhered laminated, flexible, synthetic rubber flashing
 - (a) THICKNESS: 0.090 inch (90 mil) thickness
 - (b) WATER VAPOR PERMEANANCE: 0.06 PERM (ASTM E96 B)
 - b. Henry Corporation; "Air-Bloc 16 MR".
 - 1) FLUID APPLIED VAPOR IMPERMEABLE - PRODUCT INFO:
 - (a) WATER VAPOR PERMEANANCE (ASTM E96, B): 0.03 PERM (ASTM E96 B).

- (b) TENSILE STRENGTH (ASTM D412): 100 psi.
 - (c) ELONGATION (ASTM D412): 270%.
 - (d) PUNCTURE RESISTANCE (ASTM E154): 40 LBF.
 - (e) APPLICATION TEMP: -40 °F to +180 °F
 - (f) AIR LEAKAGE TEST PER ASTM E 283.
 - (g) MEETS NFPA 285.
 - c. W. R. Meadows; "Air-Shield".
 - 1) SELF-ADHERING SHEET - PRODUCT INFO: Cross-laminated polyethylene bonded to specially modified asphalt
 - (a) THICKNESS: 40 mil thickness.
 - (b) WATER VAPOR PERMEANCE (ASTM E96, B): 0.035 PERM (ASTM E96 B).
 - (c) TENSILE STRENGTH (ASTM D412): 4000 psi.
 - (d) ELONGATION (ASTM D412): 400 MIN.
 - (e) PUNCTURE RESISTANCE (ASTM E154): 40 LBF.
 - (f) APPLICATION TEMP: 40° F Min, LOW TEMP version available at 20° F.
 - (g) AIR LEAKAGE TEST PER ASTM E 283.
 - d. Tremco; "Proglaze ETA".
 - 1) SHEET - PRODUCT INFO: Pre-engineered silicone material used as a transition assembly between the window or wall system and adjacent air and vapor barrier materials.
 - (a) TENSILE STRENGTH (ASTM D412): 1130 psi.
 - (b) ELONGATION (ASTM D412): 400 MIN., 550%
 - (c) TEAR STRENGTH (ASTM D624): 40 LBF.
 - (d) APPLICATION TEMP: Low Temp -40° F Min.
 - e. Comparable products from other manufacturers listed.
 - f. Comparable products from other manufacturers not listed, meeting specified requirements, submitted to and accepted by Architect prior to bidding.
2. Basis-of-Design Products for Detail Flashing: Subject to compliance with requirements, provide one of the following:
- a. Carlisle Coatings and Waterproofing; "Fire-Resist 705 FR-A."
 - b. Comparable products from other manufacturers listed.
 - c. Comparable products from other manufacturers not listed, meeting specified requirements, submitted to and accepted by Architect prior to bidding.
- C. Contact Adhesive: As approved by air-barrier manufacturer.
- D. Primer: Liquid primer as approved by air-barrier manufacturer for substrates involved.
- E. Detail Mastic: As approved by air-barrier manufacturer.
- F. Joint Reinforcing Fabric: Air-barrier manufacturer's woven, synthetic polymer reinforcement fabric.
- G. Joint Reinforcing Strip: Air-barrier manufacturer's self-adhering glass-fiber-mesh tape.
- H. Glass Mat: Randomly oriented glass strands held in binder soluble in wet air barrier membrane.
- 1. As approved by air-barrier manufacturer.
- I. Substrate-Patching Membrane: Manufacturer's standard trowel-grade substrate filler.
- J. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, 0.0187 inch thick, and Series 300 stainless-steel fasteners.
- K. Sprayed Polyurethane Foam Sealant: Class 1, one- or two-component, disposable, closed-cell, low-pressure spray foam insulation/sealant kits. Spray foam shall be flame retardant and have a nominal 2.0-lb/cu. ft density; 95 percent minimum closed cell content and shall meet ASTM E 84 requirements flame-spread index of 25 or less and a smoke developed rating of 300 or less based on 2-inch thickness. Provide insulation manufacturer's recommended primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.
- L. Joint Sealant:
- 1. Dow 790, 791, 795.
 - 2. Pecora 890, 891, 895.
 - 3. GE Silpruf, Silpruf LM.
 - 4. Other product approved by air barrier membrane manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
 - 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. Honeycomb and holes/cracks exceeding ¼ inch across shall be filled with grout or mortar.
 - 4. Verify that masonry joints are flush and completely filled with mortar.
 - 5. Verify that wall assemblies are dried in, such that water intrusion will not occur from above, behind or around the air barrier installation.
 - 6. Surfaces shall be supported and flush at joints without large voids or sharp protrusions.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Refer to manufacturer's literature for requirements for preparation of substrates. Surfaces shall be sound and free of voids, spalled areas, loose aggregate and sharp protrusions. Remove contaminants such as grease, oil and wax from exposed surfaces. Remove dust, dirt, loose stone and debris. Use repair materials and methods that are acceptable to manufacturer of the fluid-applied air barrier system.
- B. Exterior sheathing panels: Ensure that the boards are sufficiently stabilized with corners and edges fastened with appropriate screws. Pre-treat all screws with liquid flash to ensure recessed screws holes are filled. Gaps greater than 6mm (1/4 in.) should be filled with mastic or caulk, allowing sufficient time to fully cure before application of the tape and fluid applied air barrier system.
- C. Related Materials: Treat construction joints and install flashing as recommended by manufacturer.
- D. Clean, prepare, treat, and seal substrate and substrate joints according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air-barrier application.
- E. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- F. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- G. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching membrane.
- H. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- I. Fill cracks, gaps, and joints exceeding ¼ inch width with fill compound or sealant approved by air barrier manufacturer. Fill rough gaps around pipe, conduit and similar penetrations with mortar, non-shrink grout, fill compound or polyurethane foam sealant shaved flush.
- J. At changes in substrate plane, apply sealant or termination mastic beads to create a cant at sharp corners and edges to form a smooth transition from one plane to another.
- K. 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.

3.3 JOINT TREATMENT

- A. Concrete and Masonry: Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C 1193 and air-barrier manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM D 4258 before coating surfaces.
 - 1. Prime substrate and apply a single thickness of air-barrier manufacturer's recommended preparation coat extending a minimum of 3 inches along each side of joints and cracks. Apply a double thickness of air-barrier coating material and embed joint reinforcing in preparation coat.
- B. Gypsum Sheathing: Fill joints greater than 1/4 inch with sealant according to ASTM C 1193 and air-barrier manufacturer's written instructions. Apply first layer of air-barrier coating material at joints. Tape joints with joint reinforcing after first layer is dry. Apply a second layer of air-barrier coating material over joint reinforcing.
- C. Plywood Sheathing: Fill joints and apply air-barrier coating in strict accordance with air-barrier coating manufacturer's written instructions to suit substrate involved.

3.4 TRANSITION STRIP AND FLASHING INSTALLATION

- A. General: Install strips, transition strips, flashing, and accessory materials according to air-barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.
 - 1. Coordinate the installation of air barrier with installation of sheet metal flashing and embedded masonry through-wall flashing to ensure continuity of air barrier and drainage to exterior.
 - 2. Install transition strip between changes in substrates and base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.
 - 3. Vertical legs of metal flashings installed over fluid applied air barrier coatings shall receive transition strips and fluid applied flashings, installed as recommended by manufacturers written recommendations.
- B. Apply primer to substrates, when required by air barrier coating manufacturer, at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier coating material on same day. Re-prime areas exposed for more than 24 hours.
 - 1. Prime glass-fiber-surfaced gypsum and plywood sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.
 - 2. Where required by air barrier coating manufacturer to achieve performance specified, apply manufacturer's recommended filler coat over CMU and similar substrates.
- C. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials. Extend flashing/transition membrane into window and other openings to completely cover wood blocking and nailers in accordance with air barrier coating manufacturer's recommendations and approved shop drawings.
- D. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.
- E. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.
- F. 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.
- G. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
- H. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

3.5 INSTALLATION

- A. General: Install fluid-applied membrane air-barriers and accessory materials according to air-barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air

barrier/moisture barrier. Apply air-barrier coating within manufacturer's recommended application temperature ranges.

1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier.
 2. Coordinate the installation of air barrier with installation of weather barrier and jamb closure membranes to ensure compatibility and continuation of barriers to allow water to drain to exterior.
- B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by fluid air-barrier material 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.
- C. Vapor Retarding Fluid-Applied Membrane Material: Apply a continuous unbroken air-barrier membrane to substrates according to the following thickness. Apply air-barrier membrane in full contact around protrusions such as masonry ties.
1. Vapor-Retarding Membrane Air Barrier: Total dry film thickness as recommended in writing by air barrier manufacturer to meet performance requirements specified and as listed in Air Barrier Association of America (ABAA) for air permeance and water vapor permeance (desiccant method), but not less than 40-mil dry film thickness.
 - a. Apply additional coats as needed to achieve void- and pinhole-free surface.
 2. Extend system into window and door openings of metal-stud-framed walls.
- D. Apply strip and transition strip a minimum of 1 inch onto cured air-barrier material or strip and transition strip over cured air-barrier material overlapping 3 inches onto each surface according to air-barrier manufacturer's written instructions.
- E. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
- F. Repair punctures, voids, and deficient lapped seams. Slit and flatten fishmouths and blisters. Extend patches 6 inches beyond repaired areas, unless otherwise recommended by air barrier manufacturer.
- G. Do not cover air barrier until it has been inspected by air barrier coating manufacturer's representative and installation has been reviewed and accepted by Architect.
- H. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Air barrier coating manufacturer shall perform tests and inspections.
- B. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include, and is not limited to, the following:
1. Continuity of air-barrier system has been achieved with no gaps or holes.
 2. Continuous 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. Maximum exposure time of materials to UV deterioration has not been exceeded.
 5. Surfaces have been primed, if applicable.
 6. 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 fishmouths.
 7. Termination mastic has been applied on cut edges.
 8. Flashing strips, transition strips and liquid flashing have been firmly adhered to substrate.
 9. Compatible materials have been used.
 10. Transitions at changes in direction and structural support at gaps have been provided.
 11. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
 12. All penetrations have been sealed.
- C. Tests:
1. Adhesion Testing: Air-barrier assemblies will be tested for minimum air-barrier adhesion of 30 lbf/sq. in. according to ASTM D 4541 for each 1000 sq. ft. of installed air barrier or part thereof.

- D. 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.
- E. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.
- F. Prepare test and inspection reports.

3.7 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. If exposed to these conditions for more than 30 days, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed membrane according to air-barrier manufacturer's written instructions.
 - 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.
- C. Remove masking materials after installation.

END OF SECTION 072726

This page intentionally left blank

SECTION 074646 - FIBER CEMENT SIDING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes the following items:
 - 1. Fiber-Cement Door and Window Casings (074646.A08).
 - 2. Fiber-cement trim (074646.A16).
- B. Related Requirements:
 - 1. Section 012300 "Alternates" for those alternates affecting work of this Section.
 - 2. Section 061000 "Rough Carpentry" for wood furring, grounds, nailers, and blocking.
 - 3. Section 061600 "Sheathing" for combination wall sheathing, water resistive barrier and air barrier.
 - 4. Section 072500 "Weather Barriers" and weather-resistive barriers behind siding.

1.2 COORDINATION

- A. Coordinate siding installation with flashings and other adjoining construction to ensure proper sequencing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Samples for Verification: For each type, color, texture, and pattern required.
 - 1. 12-inch-long-by-actual-width Sample of siding.
 - 2. 12-inch-long-by-actual-width Samples of each type of trim and accessories.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of fiber-cement siding.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fiber-cement siding.
- C. Research/Evaluation Reports: For each type of fiber-cement siding required, from ICC-ES.
- D. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of product, including related accessories, to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish full lengths of fiber-cement siding including related accessories, in a quantity equal to 2 percent of amount installed.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: All fiber cement panels specified in this section must be supplied by a manufacturer with a minimum of 10 years of experience in fabricating and supplying fiber cement cladding systems.
- B. Installer Qualifications: All products listed in this section are to be installed by a single installer trained by manufacturer or representative. Installer shall have not less than 5 years successful experience, under the current company name, installing panelized fiber-cement cladding system of similar type, size and complexity as that specified for this Project.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with labels intact until time of use.
- B. Store materials on elevated platforms, under cover, and in a dry location in accordance with panel manufacturer's written recommendations.
 - 1. Panels exposed to water or water vapor prior to installation, shall be allowed to completely dry before installing.

1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace products that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including cracking and deforming.
 - b. Deterioration of materials beyond normal weathering.
 - 2. Warranty Period: 50 years from date of Substantial Completion against manufactured defects.
 - 3. Warranty Period: 15 years from date of Substantial Completion against manufactured defects in panel finish.

PART 2 PRODUCTS

2.1 FIBER-CEMENT TRIM (074646.A16)

- A. General: ASTM C 1186, Type A, Grade II, fiber-cement board trim, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide James Hardie Building Products, Inc., HardiTrim **HZ, HZ5, HZ10** Boards or comparable product by one of the following:
 - a. Cemplank.
 - b. CertainTeed Corp.
 - 2. Surface Texture: Smooth texture.
 - 3. Trim Thickness: Not less than 3/4 inch, nominal.
 - 4. Trim Face Width: As indicated.
 - 5. Factory Priming: Manufacturer's standard acrylic primer.
 - 6. Color: As selected by Architect.

2.2 ACCESSORIES

- A. Installation Accessories: Manufacturer's standard components and as follows:
 - 1. Starter track: Galvalume.
 - 2. Single Flange Sealant Backer: Galvalume.
- B. Decorative Accessories: Provide the following fiber-cement decorative accessories as indicated:
 - 1. Door and window casings.
 - 2. Moldings and trim.

- C. Flashing: Provide prefinished galvanized steel flashing complying with Section 076200 "Sheet Metal Flashing and Trim" at window and door heads and where indicated.
- D. Fasteners:
 - 1. For fastening to wood, use bugle-head screws of sufficient length to penetrate a minimum of 1 inch into substrate.
 - 2. For fastening to metal, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1/4 inch, or three screw-threads, into substrate.
 - 3. For fastening fiber cement, use hot-dip galvanized or stainless-steel fasteners.
- E. Sealant: Refer to Section 079200.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of fiber-cement siding and related accessories.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.

3.3 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
 - 1. Do not install damaged components.
 - 2. Install fasteners no more than 24 inches o.c according to siding manufacturer's written instructions.
- B. Comply with manufacturer's written installation instructions and recommendations for mechanically fastening to substrates shown. Furnish and install siding, fascia, trim and accessories in longest practicable lengths to minimize number of joints. Shim subframing as necessary to ensure work of this section is plumb, level, square and true-to-line within 1/16" in 10'-0".
 - 1. Install the work plumb, level, true and straight with no distortions. Use concealed shims. Install to a tolerance of 1/8" in 8'-0" for plumb and level; and with 1/16" maximum offset in flush adjoining 1/8" maximum offsets in revealed adjoining surfaces.
 - 2. In trim, stagger joints in adjacent and related members. Cope at returns, miter at corners, to produce tight fitting joints with full surface contact throughout length of joint. Use scarf joints for end-to-end joints.
- C. Comply with soffit manufacturer's written installation instructions and recommendations. Center nails in elongated nailing slots without binding siding to allow for thermal movement. Furnish and install soffit and accessories in longest practicable lengths to minimize number of joints.
- D. Install joint sealants as specified in Section 079200 "Joint Sealants" and to produce a weathertight installation.

3.4 ADJUSTING AND CLEANING

- A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.
- B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION 074646 074646

This page intentionally left blank

SECTION 075113 - COLD APPLIED BUILT-UP ASPHALT ROOFING

PART 1 GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Cold-applied built-up asphalt roofing system (075113.A01) for roof patching at new penetrations.
 - 2. Roof insulation.
 - 3. Roof surfacing consisting of aggregate surfacing.
- B. Related Sections include the following:
 - 1. Section 061000 "Rough Carpentry" for wood nailers, cants, curbs, and blocking.
 - 2. Section 076200 "Sheet Metal Flashing and Trim" for metal roof penetration flashings, flashings, and counterflashing's provided and warranted as part of the Work of this Section.

1.2 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.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.
- C. Provide roofing membrane, base flashings, and component materials that comply with FMG requirements as part of a roofing system for Class 1 or noncombustible construction, as applicable.
 - 1. Fire/Windstorm Classification: Class 1A-90.
 - 2. Hail Resistance: SH.
- D. Flashings: Comply with requirements of Division 07 Section "Sheet Metal Flashing and Trim." Provide base flashings, perimeter flashings, detail flashings and component materials that comply with requirements and recommendations of the following:
 - 1. FMG 1-49 Loss Prevention Data Sheet for Perimeter Flashings.
 - 2. FMG 1-29 (July 2022 Revision) Loss Prevention Data Sheet for Above Deck Roof Components.
 - 3. NRCA Roofing Manual: Membrane Roof Systems-2023 for construction details and recommendations.
 - 4. SMACNA Architectural Sheet Metal Manual (Seventh Edition) for construction details.
- 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 pressures:
 - 1. Design Pressure: As indicated on Drawings.

1.4 ACTION SUBMITTALS

- A. Product Certificate: Submit notarized certificate, indicating complete list of products intended for use under Work of this Section, including product names and numbers and manufacturers' names, with statement indicating that products to be provided meet the requirements of the Contract Documents.
- B. ASTM D2523 Certification: A certificate of successful achievement of ASTM standards specified (by a qualified and independent testing agency) for the proposed system shall be submitted and approved by owner before materials may be released or installed. Certificate shall be stamped by a registered professional engineer.

- C. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other Work.
 - 1. Base, perimeter, and detail flashings, cants, and membrane terminations.
 - 2. Tapered insulation, including slopes.
 - 3. Crickets, saddles, and tapered edge strips, including slopes.
 - 4. Insulation fastening patterns.
 - 5. Perimeter venting details.
- D. Samples for Verification: For the following products:
 - 1. 8-by-10-inch square of base sheet, ply sheet and flashing sheet.
 - 2. 8-by-10-inch square of roof insulation.
 - 3. 8-by-10-inch square of vented base sheet, base sheet, ply sheet, and flashing backer sheet.
- E. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.
- F. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - 1. Submit evidence of meeting performance requirements.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, manufacturer, and manufacturer's technical representative.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency, for roofing system and system components.
 - 1. Include report indicating compliance with roof system load-strain properties requirements.
- C. Manufacturer Certificates: Indicating compliance of proposed products with requirements, including:
- D. Product Compatibility: Indicate manufacturer has verified compatibility of roofing system components, including but not limited to: Roofing base and ply sheets, flashing sheets, reinforcement fabric felts and mats, adhesives, mastics, coatings, and sealants.
- E. Adhesive Flammability: Indicate manufacturer has verified cold process adhesives and coatings are non-flammable.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data and Training Materials: For roofing system to include in maintenance manuals and Owner's training library.
- B. Warranties: Copy of manufacturer's warranty and maintenance service agreement that covers both cold process built-up roof and metal roofing systems.
- C. Inspection Reports: Copy of daily and final technical inspection reports of roofing installation.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.
- B. Manufacturer's Technical Representative Qualifications: An authorized full-time employee representative of manufacturer experienced in the installation and maintenance of the specified roofing system and qualified to determine Installer's compliance with the requirements of this Project.
- C. Source Limitations: Obtain components for roofing system from or approved in writing by roofing system manufacturer.
- D. Exterior Fire Test Exposure: Class A; ASTM E 108, for application and roof slopes indicated.

- E. Preliminary Roofing Conference: Before starting reroofing preparation, conduct conference at Project site. Comply with requirements for preinstallation conferences in Division 01 Section "Project Management and Coordination." Review methods and procedures related to reroofing preparation and roofing system including, but not limited to, the following:
1. Meet with Owner, Owner's insurer if applicable, testing and inspecting agency representative, roofing installer, roofing system manufacturer's representative, and other installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 4. Review work restrictions and requirements for temporary facilities and controls.
 5. Examine substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 6. Review structural loading limitations of roof deck during and after roofing.
 7. Review flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
 8. Review governing regulations and requirements for insurance and certificates if applicable.
 9. Review temporary protection requirements for roofing system during and after installation.
 10. Review roof observation and repair procedures after roofing installation.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storage.
1. Where roofing system is indicated as requiring FMG classification or UL listing, containers shall bear label indicating manufacture in compliance with FMG classification or UL listing quality assurance requirements.
- B. Do not store materials in open or in contact with ground or roof surface.
- C. Store materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Store roll goods on ends only.
- D. Protect stored liquid material from direct sunlight.
1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- E. 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 manufacturers written instructions for handling, storing, and protecting during installation.
- F. Handle and store roofing materials and place equipment in a manner to avoid temporary overloading or permanent deflection of deck.

1.9 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.10 WARRANTY

- A. Warranty, General: Warranties specified shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
- B. Special Manufacturer's Warranty: Submit roofing system Manufacturer's special warranty, in which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.
1. Special warranty includes roofing membrane, base flashings, roofing membrane accessories, roof insulation, fasteners, cover boards, sheet metal flashings and trim, copings, roof edge flashings, roof edge drainage systems, counterflashing's and reglets, and roof expansion assemblies specified in other Division

- 07 Sections and other components of roofing system.
 2. Warranty Period: 15 years from date of Substantial Completion.
- C. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering Work of this Section, including all components of roofing system such as roofing membrane, base flashing, roof insulation, fasteners, cover boards, sheet metal flashings and trim, for the following warranty period:
1. Warranty Period: Two years from date of Substantial Completion.
- D. Continuing Maintenance Program: Provide an annual continuing maintenance program from Roofing Manufacturer to District with terms, conditions, and obligations as follows:
- E. A single roofing manufacturer shall provide specified warranty and maintenance service agreement for cold process built-up roof systems, all metal flashing components, and metal roofing systems. The manufacturer's warranty shall include labor and material coverage against leakage on all components including those manufactured by others. Included in the warranty and maintenance service agreement coverage for the following:
1. Damages caused by wind speed up to 74 miles per hour.
 2. Any movement associated with metal edge joints of flanges causing leaks.
 3. All new and temporary roof membrane components and adhesives.
 4. Insulation materials, fasteners, and adhesives.
 5. All metal edge components including cleat strips.
 6. All tapered edge and can't strips.
 7. All surface mastics, coatings, stripping, plies, etc.
 8. All drain and scupper flashing.
 9. Permanent and temporary roof membrane components, tie-ins, control joints, and adhesives.
- F. Warranty and Maintenance Service Agreement:
1. Period: 15 years.
 2. Provide a single document covering both cold process built-up and metal roofing systems as applicable.
 3. Roof Management and Maintenance Specification: The following services shall be provided to the building owner on a annual basis, for a period of 15 years, utilizing employees under the direct supervision of the roofing manufacturer.
 - a. Roof Inspection Report: Provide bi-annual report of roof conditions based upon roof inspections.
 - b. Storm Reports, Monitoring, and Follow-up: Roof inspections, at owner's request, of roof areas after major storm activity.
 - c. Bi-Annual Roof Top Housekeeping:
 - 1) Inspect roof membrane, drains, gutters, and scuppers for debris.
 - 2) Remove, bag, and properly dispose of all debris from the roof membrane, drains, gutters, and scuppers.
 - d. Bi-Annual Roof Preventative Maintenance to include the following:
 - 1) Metal Edge Flashing Components: Tears, splits, and breaks in the membrane flashings will be repaired with appropriate repair mastics and membranes. Open flashing strip-ins will be repaired with appropriate mastics and membranes. Metal edge cleats and clips will be re-secured. Exposed fasteners will be re-sealed.
 - 2) Parapet Wall and Counterflashing Systems: Tears, splits, and breaks in the flashings will be repaired with the appropriate repair mastics and membranes. Breaks, tears, and splits in flashing strip-ins will be repaired with appropriate repair mastics and membranes. Coat all exposed reinforcing membranes with approved mastics. Exposed fasteners will be re-sealed. Voids in terminations bars, counterflashing's and parapet caps will be cleaned and re-sealed. Resecure termination bars and counterflashing's. Check and re-secure loose metal coping caps to cleats.
 - 3) Equipment/Projection Flashing Components: Tears, splits, and breaks in the flashings will be repaired with appropriate mastics and membranes. Open or split flashing strip-ins will be repaired with appropriate mastic and membrane. Unsecured roof top equipment will be secured. Exposed fasteners will be tightened and re-sealed. Termination bars and counterflashings will be sealed. All pitch pan hoods will be re-caulked as needed. Metal projections (hoods and clamps) will be checked and resealed.
 - 4) Roof Membrane Preventive Maintenance and Repair: Tears, splits, and breaks in the roof membrane will be repaired with the appropriate repair mastic and membranes. All membrane repairs will follow the Manufacturer's written repair and maintenance guidelines. Dress up reflective coatings on flashings. Coat all exposed reinforcing membranes with approved mastics. Dress up wind scoured corners with appropriate surfacing adhesive and gravel. Re-caulking as needed.

- 5) Drains, Gutters, and Scuppers: Check and re-secure drain bolts and clamping rings. Advise owner of missing drain dome strainers. Check strip-ins around drain leaks, coat with approved mastic. Check gutter straps, joints, and strip-ins. Check inside and exterior of scuppers for open solder or caulking seals.
 - 6) Cost of Bi-Annual Inspection and Report Services shall be included in the contractor's bid amount.
 - e. Leak response responsibilities of the Manufacturer to Building Owner:
 - 1) Provide a toll free 800 number for Owner to call in leak reports, starting the day of substantial completion. Number will be monitored twenty-four (24) hours a day, 365 days a year.
 - 2) Provide a response to Owner on all leak calls within twenty-four (24) hours of when call is made.
 - 3) Provide a repair crew, at the building site, within one (1) business day of the call.
 - 4) Provide follow-up inspection to ensure that repairs were made properly.
 - f. Monitor all leak events and response, and provide a written quarterly summary. Deliver quarterly summary to Owner at the end of each quarter when leaks have occurred.
- G. Existing Warranty: Coordinate the work of this Section with the Owner so that warranties (if any) of existing roofing systems will not be adversely affected and not voided.
1. When possible, retain original installer of existing roofing system to perform work of this Section. If it is not possible to engage the original installer of existing roofing system, engage another recognized experienced and specialized firm acceptable to manufacturer of existing roofing system.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
1. Roof System: Subject to compliance with specification requirements, provide a cold process built-up roof system that meets or exceeds specified ASTM D 2523 requirements.

2.2 BASE-SHEET MATERIALS

- A. Adhered Base Sheet over insulation coverboard and nailed base sheets: Nonperforated, asphalt-coated, polyester/fiberglass/polyester reinforced sheet dusted with fine mineral surfacing on both sides which exceeds the requirements of ASTM D 4601-04, Type II, and the following properties:
1. Tensile strength, minimum, ASTM D 5147: machine direction - 225 lbf/in, cross direction - 255 lbf/in.
 2. Tear Strength, minimum, ASTM D 5147: machine direction - 390 lbf/in, cross direction - 440 lbf.
 3. Thickness, minimum, ASTM D 146: 0.065 inch
 4. Weight, minimum, ASTM D 228: 36 lb/100 sq. ft.
 5. Asphalt, minimum, ASTM D 228: 12.5 lb/100 sq. ft.

2.3 ROOFING MEMBRANE PLIES

- A. Ply Sheet (075113.A02): ASTM D 4601, Type II, Nonperforated, asphalt-coated, fiberglass reinforced sheet dusted with fine mineral surfacing on both sides which exceeds the requirements of the following properties:
1. Breaking Strength, minimum, ASTM D 146: machine direction - 90 lbf/in, cross direction - 70 lbf/in.
 2. Pliability, ½ inch radius bend, ASTM D 146: No failures.
 3. Weight, minimum, ASTM D 228: 33 lb/100 sq. ft.
 4. Mass of desaturated glass mat, minimum, ASTM D 228: 1.7 lb/100 sq. ft.
 5. Asphalt, minimum, ASTM D 228: 10 lb/100 sq. ft.
 6. Ash, ASTM D 4601: 70 – 85%
 7. Surfacing & stabilizer, maximum, ASTM D 4601: 65%
- B. Flashing Sheet (075113.A04): Elastomeric flashing compounded from a blend of EPDM and SBR thermoset elastomers and reinforced with a high strength woven polyester scrim. Sheet shall have the following physical properties:
1. Breaking Strength, minimum, ASTM D 751: 350 lbf MD and 300 lbf XMD.
 2. Tear Resistance: ASTM D 751: 77 lbf
 3. Elongation at Fabric Break, minimum, ASTM D 751: 31 percent MD and 35 percent XMD.
 4. Low Temperature Flexibility: ASTM D 2136: -40 deg F.

5. Thickness, minimum, ASTM D 751: 0.045 inches.
 6. Weight: ASTM D 751: 41.6 oz per sq yd.
- C. Vertical Wall Flashing (075113.A05): Elastomeric flashing compounded from a blend of EPDM and SBR thermoset elastomers and reinforced with a high strength woven polyester scrim, having the following physical properties:
1. Breaking Strength, minimum, ASTM D 751: 350 lbf MD and 300 lbf XMD.
 2. Tear Resistance: ASTM D 751: 77 lbf
 3. Elongation at Fabric Break, minimum, ASTM D 751: 31 percent MD and 35 percent XMD.
 4. Low Temperature Flexibility: ASTM D 2136: -40 deg F.
 5. Thickness, minimum, ASTM D 751: 0.045 inches.
 6. Weight: ASTM D 751: 41.6 oz per sq yd.

2.4 ASPHALT MATERIALS

- A. Type IV Asphalt for coverboard, insulation and base sheet: ASTM D 312, thermoplastic hot-melt adhesive, with the following properties:
1. Softening point, ASTM D 35: 215 – 225 deg F.
 2. Penetration @77 deg F, ASTM D 5: 15 – 25 dmm
 3. Flash point, minimum, @ 77 deg F, ASTM D92: 525 deg F.
 4. Equiviscous tem range, ASTM D 4402: 425 – 475 deg F.
- B. Water-Based Asphalt Primer: Water-based, polymer modified, asphalt primer with the following physical properties:
1. Asbestos Content, EPA 600/R13/116: None.
 2. Non-Volatile Content, minimum, ASTM D 2823: 32 percent.
 3. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 65 g/L.

2.5 COLD-APPLIED ADHESIVE MATERIALS

- A. Cold-Applied Adhesive for Roofing Plies and Flood Coat: One-part, asbestos-free, cold-applied adhesive specially formulated for compatibility and use with specified roofing membranes and flashings, with the following physical properties:
1. Asbestos Content, EPA 600 R-93/116: None.
 2. Volatile Organic Compounds (VOC), maximum, ASTM D 6511: 250 g/L.
 3. Nonvolatile Content, minimum, ASTM D 6511: 72 percent.
 4. Flash Point, minimum, ASTM D 93: 100 deg F.
 5. Density at 77 deg F ASTM D 6511: 7.2-7.6 lb/gal.
 6. Asphalt Content, minimum, ASTM D 6511: 50 percent.

2.6 AUXILIARY ROOFING MEMBRANE MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with built-up roofing.
- B. Asphalt Roofing Mastic: ASTM D 4586, Type II, Class 1, one-part, asbestos-free, cold-applied mastic specially formulated for compatibility and use with specified roofing membranes and flashings, with the following properties:
1. Asbestos Content, EPA 600/R13/116: None.
 2. Nonvolatile Matter, minimum, ASTM D 4586: 85 percent.
 3. Density at 77 deg F, ASTM D 1475: 9.3 lb/gal.
 4. Resistance to sag, ASTM D 4586: 1/8 in.
- C. Aluminum Roof Coating: Fibered aluminum pigmented roof coating with the following physical properties:
1. Solids (% by Weight): 61% + 1%
 2. Solids (% by Volume): 47% + 1%
 3. Viscosity: 126 + 2 K.U.
 4. Metal Content, ASTM D 2824: Min. 15%
 5. Flashpoint, ASTM D 3278: 105 degrees F

- 6. Reflectance, ASTM C 1549-02: >60
- D. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FM 4470; designed for fastening roofing membrane components to substrate; tested by manufacturer for required pullout strength; and acceptable to roofing system manufacturer.
- E. Aggregate Surfacing: ASTM D 1863, No. 6 or No. 67, clean, dry, Kunchek.
- F. Miscellaneous Accessories: Provide miscellaneous accessories recommended by roofing system manufacturer.

2.7 ROOF INSULATION

- A. General: Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.
 - 1. Where patching existing roof occurs, match existing thicknesses as required to maintain consistency of roof assembly.
- B. Polyisocyanurate Board Insulation (075113.A10): ASTM C 1289, Type II, Class 1, Grade 2, HCFC-free, with felt or glass-fiber mat facer on both major surfaces.
 - 1. Base layer thickness shall not be less than 1.5 inches and have a minimum R-value of 8.5.
 - 2. Second layer of insulation, other than tapered, shall be 3 inches thick and have a minimum R-value of 17.4.
 - 3. Overall insulation thickness shall not be less than 5.5 inches, except at roof drains where minimum insulation thickness is 1 inch.
- C. Tapered Polyisocyanurate Board Insulation (075113.A11): ASTM C 1289-11, Type II, Class 1, Grade 2, HCFC-free, with felt or glass-fiber mat facer on both major surfaces. Slope insulation at ¼ inch per foot, unless a steeper slope is indicated.
- D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.8 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.
- C. Wood Fiber Can't Strips (075113.A12): ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board
- D. Cover Board (075113.A15): ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, ½ inch thick.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Georgia Pacific Corporation; Dens Deck.
 - b. National Gypsum Company; Gold Bond eXP Extended Exposure Sheathing.
 - c. USG Corporation; Securock Glass Mat Roof Board.

2.9 VAPOR RETARDER

- A. Self-Adhering-Sheet Vapor Retarder: ASTM D 1970/D 1970M, polyethylene film laminated to layer of rubberized asphalt adhesive, minimum 40 mil total thickness; maximum permeance rating of 0.1 perm; cold applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor retarder manufacturer.

PART 1 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
 - 1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
 - 2. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. 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.
- C. Prime concrete and masonry surface with asphalt primer at a rate of 3/4 gal./100 sq. ft. and allow primer to dry.

3.3 INSTALLATION, GENERAL

- A. Install roofing system in accordance with manufacturer's recommendations.
- B. Install roofing system in accordance with the following NRCA Manual Plates and NRCA recommendations; modify as required to comply with requirements of FMG references above:
 - 1. Base Flashing at Interior Walls: Plates BUR-5 and BUR-5S.
 - 2. Vented Base Flashing at Parapet Wall: Where BUR is not terminated behind counterflashing, but extends to coping, terminate similar to Plates BUR-5A and BUR-5AS beneath coping leg.
 - 3. Vented Base Flashing and Counterflashing at Parapet Wall: Plates BUR-5A and BUR-5AS.
 - 4. Perimeter Flat Edge: Plates BUR-3 and BUR-3S.
 - 5. Perimeter Raised Edge: Plates BUR-2 and BUR-2S.
 - 6. Penetration, Structural Member: Plates BUR-14 and BUR-14S.
 - 7. Penetration, Sheet Metal Enclosure: Plates 15 and 15S.
 - 8. Penetration, Stack Flashing: Plates BUR-17 and BUR-17S.
 - 9. Penetration, Pocket: Plates BUR-19 and BUR-19S.
- C. Roof Drain: Plates BUR-20 and BUR-22S.

3.4 VAPOR RETARDER INSTALLATION

- A. Self-Adhering-Sheet Vapor Retarder: Prime substrate if required by manufacturer. Install self-adhering-sheet vapor retarder over area to receive vapor retarder, side and end lapping each sheet a minimum of 3-1/2 and 6 inches, respectively.
- B. Extend vertically up parapet walls and projections to a minimum height equal to height of insulation and cover board.
- C. Seal laps by rolling.
- D. Coordinate installation and transition of roofing vapor retarder with air barrier specified in Section 072729.
- E. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into roofing system.

3.5 INSULATION INSTALLATION

- A. Coordinate installing roofing system components, so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with roofing system manufacturer's written instructions for installing roof insulation.
- C. Add additional wood nailers along outside perimeter to accommodate new tapered insulation system.
- D. Wood Fiber Can't Strips: Adhere and secure fiber cant strips at junctures of built-up roofing membrane system. Adhere with solid application of cold insulation adhesive.
- E. 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 inch with insulation.
 - 1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
 - 2. Miter corners of tapered insulation, lacing-in of corners is prohibited.
- F. Install insulation at the specified thickness.
- G. Install two or more layers of insulation under area of roofing to achieve thickness indicated. Where overall insulation thickness is greater than 2 inches, install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.
- H. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water, and provides sump as recommended by mfg.
- I. Mechanically Fastened Insulation (base layer of insulation on metal): Install insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - 1. Fasten insulation according to FM 1-90 Windstorm Classification and as tested according to primary roofing material manufacturer's standards; most stringent requirements shall take precedence.
 - 2. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.
- J. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Stagger joints from joints in insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together and adhere to roof deck.
 - 1. Apply hot asphalt insulation adhesive to underside and immediately bond cover board to substrate. Coverage shall be fully adhered at 30 lbs per 100 square feet.

3.6 ROOFING MEMBRANE INSTALLATION, GENERAL

- A. Install built-up roofing membrane system according to roofing system manufacturer's written instructions and applicable recommendations of ARMA/NRCA's "Quality Control Guidelines for the Application of Built-up Roofing."
- B. Start installation of built-up roofing membrane in presence of roofing system manufacturer's technical personnel.
- C. Coordinate installing roofing system components, so insulation and roofing membrane sheets are not exposed to precipitation or left exposed at the end of the workday or when rain is forecast.
- D. Provide tie-offs at end of each day's work to cover exposed roofing membrane sheets and insulation with a course of coated felt set in roofing cement with joints and edges sealed.
- E. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
 - 1. Remove and discard temporary seals before beginning work on adjoining roofing.
- F. Cold Process Asphalt Heating
 - 1. An in-line heat exchange unit may be used to facilitate application.
 - 2. Do not exceed maximum adhesive temperature of 100° F.
 - 3. Heat exchange unit: Use heat transfer oil approved by heating equipment manufacturer.

4. Follow operation procedures recommended by heating equipment manufacturer.
- G. Substrate-Joint Penetrations: Prevent roofing asphalt from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

3.7 ROOFING MEMBRANE INSTALLATION

- A. Install one lapped course of base sheet, extending sheet over and terminating beyond cants. Adhere base sheet as follows:
 1. Fully adhere base sheet with cold adhesive, coverage shall be solid layers at 25-lbs per 100 square feet.
- B. Install three-ply sheets starting at low point of roofing system. Align ply sheets without stretching. Shingle side laps of ply sheets uniformly to achieve required number of plies throughout thickness of roofing membrane. Shingle in direction to shed water. Extend ply sheets over and terminate beyond cants.
 1. Embed each ply sheet in a solid spray application of cold, fluid-applied adhesive, not less than 2.5 gals. per 100 square feet, to form a uniform membrane without ply sheets touching.
- C. Aggregate Surfacing (075113.A17): Promptly after installing and testing roofing membrane, base flashing, and stripping, flood-coat roof surface with 6 gal/100 sq. ft. of cold fluid-applied adhesive. While flood coat is fluid, cast the following average weight of Kunchek aggregate in a uniform course:
 1. Aggregate Weight: 500-lb/100 sq. ft.

3.8 FLASHING AND STRIPPING INSTALLATION

- A. Install base flashing over can't 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 as follows:
 1. Prime substrates with asphalt primer if required by roofing system manufacturer.
 2. Flashing Sheet Application: Adhere flashing sheet to substrate in cold adhesive applied at rate required by roofing system manufacturer.
- B. Extend base flashing up walls or parapets a maximum of 12 inches above roofing membrane and 6 inches onto field of roofing membrane.
- C. Mechanically fasten top edge of base flashing with flat aluminum bar.
 1. Seal top termination of base flashing with a strip of glass-fiber fabric set in asphalt roofing cement.
 2. Strip-in with 3-course at base of flashing and all vertical laps (mastic, mesh, mastic)
 3. Fasten termination bar 8" on center.
- D. At perimeters fasten base flashing to wood nailers per manufacturer's recommendations.
- E. Lift vent covers and wrap base flashing over the top of the existing curbs.
- F. Install stripping, according to roofing system manufacturer's written instructions, where metal flanges and edgings are set on built-up roofing.
- G. Roof Drains: Set 30" x 30" 4 lb. lead flashing in bed of asphalt roofing cement on completed roofing membrane. Sump drain area 48" x 48". Cover metal flashing with stripping and extend a minimum of 4 inches beyond edge of metal flashing onto field of roofing membrane. Clamp roofing membrane, metal flashing, and stripping into roof-drain clamping ring.
- H. Install new 4 lb. leads over soil stacks and strip-in with 2 plies of trilaminate felt in cold mastic.
- I. Install new pitch pans with hoods around mechanical support legs, conduit, and other miscellaneous projections. Strip-in with 2 plies of trilaminate felt in cold mastic.

3.9 COATING INSTALLATION

- A. Apply two layers of aluminum coating to base flashings, vertical wall flashings, plumbing pipes, drain strainers, and rusted equipment according to manufacturer's written instructions.

- B. Aluminum Roof Coating: Once flashing mastic has adequately cured, apply reflective aluminum roof coating according to manufacturer's written instructions, by spray, roller, or other suitable application method. Apply in two coat application of 1 gal./100 sq. ft. per coat.

3.10 FIELD QUALITY CONTROL

- A. Test Cuts: Before flood coating and surfacing built-up roofing membrane, test specimens may be removed to evaluate problems observed during quality-assurance inspections of roofing membrane as follows:
 - 1. Approximate quantities of components within roofing membrane will be determined according to ASTM D 3617.
 - 2. Test specimens will be examined for interply voids according to ASTM D 3617 and to comply with criteria established in Appendix 3 of ARMA/NRCA's "Quality Control Guidelines for the Application of Built-up Roofing."
- B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Owner.
 - 1. Notify Owner 48 hours in advance of date and time of inspection.
- C. Repair or remove and replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.11 PROTECTING AND CLEANING

- 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 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.
 - 1. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.12 SCHEDULE OF SPECIAL WARRANTIES AND SERVICE AGREEMENTS

- A. The following documents are referenced in this Section and are attached following this Section; complete and submit documents in accordance with requirements:

3.13 MANUFACTURER'S SPECIAL WARRANTY

- A. Roofing Installer's Warranty
- B. Roofing System Manufacturer's Continuing Maintenance Program
- C. Warranty shall include:
 - 1. Authorized Signature:
 - 2. Name:
 - 3. Title:
 - 4. Manufacturer:
 - 5. Address:
 - 6. Telephone number:
 - 7. Owner: Liberty Public Schools
 - 8. Address: 650 Conistor - Liberty, Missouri 64068
 - 9. Building Name/Type:
 - 10. Address:

END OF ROOFING INSTALLER'S WARRANTY

4.1 ROOFING SYSTEM MANUFACTURER'S CONTINUING MAINTENANCE PROGRAM

- A. WHEREAS _____ of _____, herein called the "Manufacturer," has supplied roofing membrane and associated materials and approved all other related materials ("materials") on the following project:
1. Owner: Liberty Public Schools
 2. Address: 650 Conistor - Liberty, Missouri 64068
 3. Building Name/Type:
 4. Address:
 5. Area of Work:
 6. Acceptance Date:
 7. Warranty Period: 15 years from date of Substantial Completion
 8. Expiration Date:
 9. Roofing Installer:
 10. Contractor:
- B. MANUFACTURER WILL provide Roofing System Continuing Management and Maintenance services to the Owner, on an annual basis, for a period of 15 years, performed under direction of Manufacturer's Authorized Service Representative, as described below:
- C. Roof Inspection Report: Provide roof inspection and report of roof conditions based upon roof inspections. Report shall be provided through an on-line database system specifically addressing the designated roof areas.
- D. Roof inspection at Owner request following major storm activity.
- E. Roof Housekeeping: Inspect roof membrane, drains, gutters, and scuppers. Remove, bag and properly dispose of all debris.
- F. Roof Membrane Preventive Maintenance and Repair: Repair tears, splits and breaks in the roof membrane with appropriate repair mastic and membranes in accordance with Membrane Manufacturer's written repair and maintenance guidelines. Dress up reflective coatings on flashings. Coat all exposed reinforcing membranes with approved mastics.

4.2 ROOF FLASHING PREVENTIVE MAINTENANCE:

1. Metal Edge and Flashing Components: Repair tears, splits, and breaks in membrane flashings and open flashing strip-ins with appropriate repair mastics and membranes. Secure loose metal edge cleats and clips. Tighten and reseal exposed fasteners.
 2. Parapet, Wall, and Counterflashing Systems: Repair tears, splits, and breaks in metal flashings and open flashing strip-ins with appropriate repair mastics and membranes. Coat all exposed reinforcing membranes with approved mastics. Tighten and reseal exposed fasteners. Clean and seal voids in termination bars, counterflashing's, and parapet caps. Secure loose termination bars and counterflashings. Check and re-secure loose metal coping caps.
 3. Equipment/Projection Flashing Components: Repair tears, splits, and breaks in metal flashings and open flashing strip-ins with appropriate repair mastics and membranes. Secure unsecured roof top equipment. Tighten and reseal exposed fasteners. Clean and seal voids in termination bars. Refill pitch pans. Check and reseal metal projections (hoods and clamps).
- B. Drainage Systems Preventive Maintenance: Check and re-secure drain bolts and clamping rings. Advise owner of missing drain dome strainers. Check strip-ins around drain leads and coat with approved mastic. Check gutter straps, joints, and strip-ins. Check inside and exterior of scuppers for open solder or caulking seals.
- C. Roof Systems Leak Response:
1. In the event of a roof system leak, Manufacturer shall provide to Owner:
 - a. Toll free 800 number for Owner for leak report, monitored twenty-four hours per day, 365 days a year.
 - b. Response to Owner on all leak calls within twenty-four hours.
 - c. Qualified repair crew at the building site within two business days of call.

- d. Follow-up inspection by Manufacturer's Authorized Service Representative with written report to Owner.
 - e. Written summary of leak events, repairs, and inspections to Owner at end of each quarter in which leaks have occurred.
- D. Roofing System Continuing Management and Maintenance Services repair coverage exclude such damage to the roof system excluded from the Manufacturer's Warranty as a result of negligence, vandalism, or other excluded cause as described in manufacturer's published terms and conditions at the original date of this Contract.
- E. SUBMITTED this _____ day of _____, 2019.
 - 1. Name:
 - 2. Title:
 - 3. Manufacturer:
 - 4. Address:
 - 5. Telephone Number:

END OF ROOFING SYSTEM MANUFACTURER'S CONTINUING MAINTENANCE PROGRAM

WARRANTY PERIOD: 20 YEARS, FULL SYSTEM, FROM DATE OF SUBSTANTIAL COMPLETION.

END OF SECTION 075113

This page intentionally left blank

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Formed Products:
 - a. Formed roof drainage sheet metal fabrications.
 - b. Formed wall sheet metal fabrications.
 - c. Formed equipment support flashings.
 - d. Premanufactured pitch pockets.
- B. Related Sections:
 - 1. Section 012300 "Alternates" for those alternates affecting work of this Section.
 - 2. Section 042000 "Unit Masonry" for masonry through wall flashing.
 - 3. Section 061000 "Rough Carpentry " for wood nailers, curbs, and blocking.
 - 4. Section 072100 "Thermal Insulation"

1.2 COORDINATION

- A. 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.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints and seams to provide leakproof, secure and non-corrosive installation.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct Conference at Project Site.
 - 1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment and facilities needed to make progress and avoid delays.
 - 2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs and condition of other construction that affects sheet metal flashing and trim.
 - 3. Review requirements for insurance and certificates, if applicable.
 - 4. Review sheet metal flashing observation and repair procedures – post flashing installation.
 - 5. Meet with Owner, Architect, Installer and other Installers whose work interfaces with or affects sheet metal flashing and trim – including installers of roofing materials, roof accessories and roof-mounted equipment.
 - 6. Review methods and procedures related to sheet metal flashing and trim.
 - 7. Review special roof details, roof drainage, roof penetrations, equipment curbs and condition of other construction that will affect sheet metal flashing.
 - 8. Review sequencing of sheet metal flashing installation with other related trades to coordinate installation.
 - 9. Document proceedings, including corrective measures and actions required, and furnish copy of records to each participant.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
- B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:
 - 1. Identification of material, thickness, weight, and finish for each item and location in Project.
 - 2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
 - 3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.

4. Details of termination points and assemblies, including fixed points.
5. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashing as applicable.
6. Details of special conditions and of connections to adjoining work.
7. Detail formed flashing and trim at a scale of not less than 3 inches per 12 inches.
8. Include details of roof-penetration flashing.
9. Include details of expansion joints and expansion-joint covers – show direction of expansion and contraction joints from fixed points.

- C. Samples for Verification: For each type of exposed finish required, prepared on 6 inch square samples of actual metal to be used in the work.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified fabricator.
- B. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.
- C. Warranty: Sample of special warranty.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
 1. For copings and roof edge flashings that are SPRI ES-1 compliant, shop shall be SPRI ES-1 certified and listed as able to fabricate required details as tested and approved.
- B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual", Sixth Edition, unless more stringent requirements are specified or shown on Drawings.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. 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 and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

1.8 WARRANTY

- A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM 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. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or

loosen, and shall remain watertight.

1. SPRI Wind Design Standard: Manufacture and install copings and roof edge flashings tested in accordance with ANSI/SPRI/FM 4435/ES-1 and capable of resisting the following design pressure:
 - a. Design Pressure: As indicated on Drawings.
 2. Sheet metal flashings shall be installed in accordance with ANSI/SPRI/FM 4435/ES-1 "Wind Design Standard for Edge Systems used with Low Slope Roofing Systems" as applicable for locations and configurations indicated on Drawings.
- B. 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.
- C. Recycled Content: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
- D. Fabricate and install roof edge flashing capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49.
1. Wind Zone 1: For velocity pressures of 21 to 30 lbf/sq. ft.: 60-lbf/sq. ft. perimeter uplift force, 90-lbf/sq. ft. corner uplift force, and 30-lbf/sq. ft. outward force.
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.
1. Contractor shall use gauges or thicknesses specified or as prescribed in the referenced standards for specific girths, whichever is greater.
- B. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, dead soft, fully annealed.
1. Finish: 2D (dull, cold rolled).
 2. Surface: Smooth, flat.
- C. 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. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality.
 2. Surface: Smooth, flat.
 3. Exposed Coil-Coated Finish:
 - a. 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. Colors: As selected by Architect from manufacturer's full range. Refer to Exterior Finish Legend for color matching requirements for sheet metal flashing and trim installed adjacent to metal wall panels, storefront and curtain wall.
 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 a minimum total dry film thickness of 0.5 mil.

2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet (076200.A01): Minimum 30 to 40 mils () 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 and compatible with self-adhering air barrier transition membrane.
1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F.
 2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F.
 3. Products: Subject to compliance with requirements, provide one of the following:

- a. Carlisle Coatings & Waterproofing Inc.; CCW WIP 300HT.
 - b. Grace Construction Products, a unit of W. R. Grace & Co.; Ultra.
 - c. Henry Company; Blueskin PE200 HT.
- B. Slip Sheet: Building paper, 3-lb/100 sq. ft. minimum, rosin sized.
- C. Flexible Membrane Closure (076200.A04): EPDM Sheet membrane; at roof expansion joints provide non-reinforced flexible, black EPDM synthetic rubber sheet flashing of 45 to 60 mils thickness. EPDM sheet shall have a tensile strength of not less than 1200 psi, a tear resistance of at least 20 lbs per inch and an ultimate elongation of at least 250 percent. Provide with seam and splice tape, adhesives and all other accessories required for proper and watertight installation.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.
 - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - 2. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
 - 3. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329 or Series 300 stainless steel.
- C. Solder:
 - 1. For Stainless Steel: ASTM B 32, Grade Sn60, with an acid flux of type recommended by stainless-steel sheet manufacturer.
- D. Sealant Tape (076200.A02): 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 inch wide and 1/8 inch thick.
- E. Elastomeric Sealant (076200.A03): ASTM C 920, elastomeric silicone polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- H. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- I. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.
- J. Pre-Manufactured Pourable Sealer Pockets: Use only on non-structural penetrations that are flexible and those that are closely spaced. Provide pre-fabricated pourable sealer pocket system filled with fast-setting, solvent-free, multi-use waterproof sealer. Pre-fabricated pourable sealer pocket components shall connect together by means of tongue-and-groove joints, and shall be manufactured from a high-strength, flexible polyurethane elastomer. Pocket components shall join together to create pockets of varying sizes.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide "Lockin Pocket interlocking Pitch Pocket System" as manufactured by Weather-Tite, or comparable product submitted to and accepted by Architect prior to bidding.
 - 2. Product Characteristics:
 - a. Pourable sealer pocket components and sealer color shall be black.
 - b. Height: Not less than 4 inches above field of roof.
 - c. Warranty: Not less than 2 years.

2.5 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the 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 without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
 - 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed 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 inch in 20 feet on slope and location lines as indicated and within 1/8-inch () offset of adjoining faces and of alignment of matching profiles.
- C. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.
- D. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
 - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
 - 2. Use lapped expansion joints only where indicated on Drawings.
- E. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- F. Cleats (076200.A36): Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" and by FMG Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.
 - 1. Cleats for coping, gravel stop edges and fascia caps shall be fabricated from not less than 0.040 inch thick (20 gauge) galvanized steel and shall be continuous 10 foot lengths with ¼ inch gap between sections.
- G. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- H. Do not use graphite pencils to mark metal surfaces.

2.6 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof Edge Flashing (Gravel Stop 076200.A11) and Fascia (076200.A12): Fabricate in minimum 96-inch- long, but not exceeding 12-foot- long sections. Furnish with 6 inch wide cover plates. Shop fabricate interior and exterior corners.
 - 1. Joint Style: Butted with expansion space and 12-inch-wide, concealed backup plate.
 - 2. Fabricate edging similar to SMACNA (Sixth Edition), Figures 2-1B and 2-5C.
 - 3. Fabricate fascia similar to SMACNA (Sixth Edition), Figures 2-7A and 2-7B.
 - a. Coil-Coated Galvanized Steel: 0.034 inch thick.
- B. Copings and Caps (076200.A13): Fabricate in minimum 96-inch- long, but not exceeding 10-foot- long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, seal, and solder or weld watertight.
 - 1. Coping Profile: Similar to SMACNA figures designation 3-1A, 3-4A and 3-8D.
 - 2. Cap Profile: Similar to SMACNA figure designation 4-5C, with 4inch high flange.
 - 3. Joint Style:
 - a. At coping: Similar to SMACNA, Figure 3-1, Detail 2, with drive cleat over top and "J1" 3-inch lap joint on vertical faces.
 - b. At caps: Similar to SMACNA, Table 3-1, joint "J2" with butt and backup plate.
 - 4. Fabricate from the following materials:
 - a. Coil-Coated Galvanized Steel: 0.034 inch thick.
- C. Flashing Receivers (076200.A19): Fabricate from the following materials:

1. Stainless Steel: 0.019 inch thick.
 2. Where receivers are indicated to project through exterior wythe, horizontal leg of receiver shall be 3 to 3-1/2 inches long.
 3. Where receivers are cut-in to masonry joint or partially embedded in masonry joint, fabricate similar to SMACNA (Sixth Edition), Figure 4-4C.
 4. Where receivers are mechanically fastened to vertical surface, vertical leg of receiver shall be at least 4 inches tall, similar to SMACNA, Figure 4-5C with receiver formed similar to Figure 4-4D.
- D. Roof-Penetration Flashing (076200.A20): Fabricate from the following materials:
1. Coil-Coated Galvanized Steel: 0.034 inch thick.

2.7 WALL SHEET METAL FABRICATIONS

- A. Opening Flashings in Frame Construction: Fabricate head, sill, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch-high, end dams. Fabricate from the following materials:
1. Coil-Coated Galvanized Steel: 0.034 inch thick.

2.8 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Equipment Support Flashing (076200.A33): Fabricate from the following materials:
1. Galvanized Steel: 0.034 inch thick.
- B. Pre-Finished Miscellaneous Metal Flashing and Trim (076200.A35): Fabricated from the following materials:
1. Coil-Coated Galvanized Steel: 0.034 inch thick.
 2. Stainless Steel: 0.031 inch thick.
 3. At metal wall panels, fabricate to configurations indicated, with vertical leg not less than 4 inches tall to extend up and behind rigid insulation. Fabricate ends of flashing with end dams not less than 2 inches tall, and extending out to face of wall panel.
 4. At pan flashing for windows, storefront and curtain wall; fabricate to configurations indicated, with horizontal leg to extend 2 inches beneath window, storefront or curtain wall sill as occurs.
 5. Fabricate trim to configurations indicated.
 6. Fabricate pre-finished miscellaneous metal flashing in lengths of 8 to 10 feet. Overlap adjoining pieces 4 inches and seal joint watertight.
- C. Premanufactured Pitch Pockets: A pre-fabricated interlocking pitch pocket system filled with fast setting, solvent free, multi-use waterproof sealer. Prefabricated pockets connect with tongue and groove joints and are composed of high strength, flexible elastomer. Pieces join together to create pockets of varying sizes.
1. Basis-of-Design product: "Lockin' Pocket Interlocking Pitch Pocket System" by Weather-Tite.
 2. Product Characteristics:
 - a. Pocket and Sealer Color: Black.
 - b. Height: 4 inches above field of roof.
 - c. Warranty: Not less than 2 years.
 3. Prepare Substrates and install pitch pockets in accordance with manufacturer's printed instructions to accommodate substrates involved.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.
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.
- B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

- A. General: Install underlayment as indicated on Drawings.
- B. Self-Adhering High Temperature Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Apply primer if required by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.
- C. Flexible Membrane Closure EPDM Underlayment: Install EPDM underlayment wrinkle free and continuously sealed between sheets and all laps for watertight installation at roof expansion joints to form a bellows. Install an additional sheet over the top of coping, wall caps, and expansion joint bellows securely attached to wall substrate and adhered to over top of blocking/curb and turned down 1-1/2 inches.
- D. Apply slip sheet, wrinkle free, over underlayment before installing sheet metal flashing and trim.

3.3 INSTALLATION, GENERAL

- 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, welding rods, 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 and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, 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 inches apart. Anchor individual cleats with two fasteners and bend tabs over fasteners.. At continuous cleats, interlock bottom edge of roof edge flashing with continuous cleat. Anchor continuous cleat to substrate at 2 inches in from each end and then at not greater than 12-inch centers. Bend tabs over fasteners.
 - 4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
 - 5. Install sealant tape where indicated.
 - 6. All lap joints in pre-finished miscellaneous metal flashing shall be sealed watertight.
 - 7. Torch cutting of sheet metal flashing and trim is not permitted.
 - 8. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
 - 1. Coat back side of stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of EPDM underlayment and cover with a slip sheet or install a course of polyethylene sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection.
 - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
 - 2. Use lapped expansion joints only where indicated on Drawings.
- D. Fastener Sizes: Use fasteners of sizes that will penetrate wood sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
- E. Seal joints as shown and as required for watertight construction.
 - 1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F, 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.
2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."
- F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except reduce pre-tinning where pre-tinned surface would show in completed Work.
1. Do not solder metallic-coated steel sheet.
 2. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
 3. Stainless-Steel Soldering: Tin edges of uncoated sheets using solder recommended 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.
- G. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints a minimum of 4 inch in direction of water flow. Provide EPDM bellows and EPDM cap flashing beneath expansion joint cover as specified.

3.4 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.
1. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at 2 inches in from each end and then at not greater than 12-inch centers.
- C. Copings: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.
1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 2 inches in from each end and then at not greater than 12-inch centers.
 2. Anchor interior leg of coping with screw fasteners and washers at 16 inch centers.
- D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches 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 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with sealant. Secure in a waterproof manner.
- F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.
- G. Pourable Sealer Pocket Installation: Prepare substrates and install pockets in strict accordance with pocket manufacturer's written instructions to accommodate substrates involved.

3.5 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Through-Wall Flashing: Installation of through-wall flashing is specified in Section 042000 "Unit Masonry."
- C. Opening Flashings in Frame Construction: Install continuous head, sill, and similar flashings to extend ()4 inches beyond wall openings.

3.6 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. Pre-Finished Miscellaneous Metal Flashing: Coordinate installation of flashing with adjoining construction and air barrier coating. Seal lap joints watertight.

3.7 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.8 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 manufacturers' written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.
- E. 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.

END OF SECTION 076200

This page intentionally left blank

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Penetrations in fire-resistance-rated walls and floors
- B. Related Sections:
 - 1. Division 07 Section "Fire-Resistive Joint Systems" for joints in or between fire-resistance-rated construction, at exterior curtain-wall/floor intersections, and in smoke barriers.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.
 - 1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A firm experienced in installing penetration firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.
- B. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:
 - 1. Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:
 - a. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.
 - b. Classification markings on penetration firestopping correspond to designations listed by the following:
 - 1) UL in its "Fire Resistance Directory."
- C. Preinstallation Conference: Conduct conference at Project site.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

- B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.6 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Grace Construction Products.
 - 2. Hilti, Inc.
 - 3. Johns Manville.
 - 4. Specified Technologies Inc.
 - 5. 3M Fire Protection Products.
 - 6. Tremco, Inc.; Tremco Fire Protection Systems Group.
 - 7. USG Corporation.
- B. Single Source Responsibility: All firestopping insulation, sealants, and related firestopping accessories required to prevent the passage of fire and smoke through fire rated penetrations, smoke rated penetrations and joints shall be furnished and installed by (or installed under direct supervision of) one contractor for the entire project. All products used for this work shall be furnished by one manufacturer for the entire project.

2.2 PENETRATION FIRESTOPPING (078413.A01)

- A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
- B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
 - 1. Fire-resistance-rated walls include fire walls fire-barrier walls and fire partitions.
 - 2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- D. VOC Content: Provide penetration firestopping that complies with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Architectural Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.
- E. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.
 - 1. Permanent forming/damming/backing materials, including the following:
 - a. Slag-wool-fiber or rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fillers for sealants.

2. Substrate primers.
 3. Collars.
- F. Firestopping compounds shall be paintable or capable of receiving finish materials in areas which are exposed to view and scheduled to receive finishes.

2.3 FILL MATERIALS

- A. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- B. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- C. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- D. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- E. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
- F. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of nonsag grade for both opening conditions.

2.4 MIXING

- A. For those products requiring mixing before application, comply with penetration firestopping 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. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:
 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.
 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by 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 penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping's seal with substrates.

3.3 INSTALLATION

- A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.
- C. Install fill materials for firestopping by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 - 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 the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches 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. Designation of applicable testing and inspecting agency.
 - 4. Date of installation.
 - 5. Manufacturer's name.
 - 6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Firestopping Manufacturer's representative shall perform and inspections of penetration firestopping. Contractor shall notify Architect and manufacturer's representative no later than seven days after penetration firestopping is complete to schedule inspection.
 - 1. Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.
 - 2. Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

3.7 PENETRATION FIRESTOPPING SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.

END OF SECTION 078413

This page intentionally left blank

SECTION 078446 - FIRE RESISTIVE JOINT SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Joints in or between fire-resistance-rated constructions. (078446.A01).
- B. Related Sections:
 - 1. Division 07 Section "Penetration Firestopping" for penetrations in fire-resistance-rated walls, horizontal assemblies, and smoke barriers.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Schedule: For each fire-resistive joint system. Include location and design designation of qualified testing agency.
 - 1. Where Project conditions require modification to a qualified testing agency's illustration for a particular fire-resistive joint system condition, submit illustration, with modifications marked, approved by fire-resistive joint system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fire-resistive joint systems.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Installer Certificates: From Installer indicating fire-resistive joint systems have been installed in compliance with requirements and manufacturer's written recommendations.

1.4 QUALITY ASSURANCE

- A. 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 UL's "Qualified Firestop Contractor Program Requirements." Firm shall be experienced in installing fire-resistive joint systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its fire-resistive joint system products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.
- B. Fire-Test-Response Characteristics: Fire-resistive joint systems shall comply with the following requirements:
 - 1. Fire-resistive joint system tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Fire-resistive joint systems are identical to those tested per testing standard referenced in "Fire-Resistive Joint Systems" Article. Provide rated systems complying with the following requirements:
 - a. Fire-resistive joint system products bear classification marking of qualified testing agency.
 - b. Fire-resistive joint systems correspond to those indicated by reference to designations listed by the following:
 - 1) UL in its "Fire Resistance Directory."

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistive joint system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Install and cure fire-resistive joint systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.6 COORDINATION

- A. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.
- B. Coordinate sizing of joints to accommodate fire-resistive joint systems.

PART 2 PRODUCTS

2.1 FIRE-RESISTIVE JOINT SYSTEMS (078446.A01)

- A. Where required, provide fire-resistive joint 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 assemblies in or between which fire-resistive joint systems are installed. Fire-resistive joint systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.
- B. Joints in or between Fire-Resistance-Rated Construction: Provide fire-resistive joint systems with ratings determined per ASTM E 1966 or UL 2079:
 - 1. Joints include those installed in or between fire-resistance-rated walls floor or floor/ceiling assemblies and roofs or roof/ceiling assemblies.
 - 2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of construction they will join.
 - 3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Grace Construction Products.
 - b. Hilti, Inc.
 - c. Johns Manville.
 - d. Specified Technologies Inc.
 - e. 3M Fire Protection Products.
 - f. Tremco, Inc.; Tremco Fire Protection Systems Group.
 - g. USG Corporation.
- C. Exposed Fire-Resistive Joint Systems: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
 - 1. Sealant shall have a VOC content of 250 g/L or less.
- D. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to maintain ratings required. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing agency for systems indicated.
- E. Firestopping compounds shall be paintable or capable of receiving finish materials in areas which are exposed to view and scheduled to receive finishes.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
 - 1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.
 - 2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by fire-resistive joint system 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 fill materials of fire-resistive joint system from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates.

3.3 INSTALLATION

- A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming 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.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.
- C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by joints and forming 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 the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Identify fire-resistive joint systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches 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. Designation of applicable testing agency.
 - 4. Date of installation.
 - 5. Manufacturer's name.

6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Inspecting Agency: Fire-Resistive Joint System manufacturer's representative will perform inspections of completed installation of work of this Section. Contractor shall notify Architect and manufacturer's representative not later than seven days after completion of fire-resistive joint system installation to schedule inspection.
- B. Where deficiencies are found or fire-resistive joint systems are damaged or removed due to testing, repair or replace fire-resistive joint systems so they comply with requirements.
- C. Proceed with enclosing fire-resistive joint systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTING

- A. Clean off excess fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by fire-resistive joint system manufacturers and that do not damage materials in which joints occur.
- B. Provide final protection and maintain conditions during and after installation that ensure fire-resistive joint systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

3.7 FIRE-RESISTIVE JOINT SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHBN or Category XHDG.
- B. Wall-to-Wall, Fire-Resistive Joint Systems:
 1. UL-Classified Systems: WW-S-0000-0999.
 2. Assembly Rating: 2 hours.
 3. Nominal Joint Width: As indicated.
 4. Movement Capabilities: Class II - 25 percent compression or extension.
 5. L-Rating at Ambient: As selected by Contractor to suit project conditions.
- C. Floor-to-Wall, Fire-Resistive Joint Systems:
 1. UL-Classified Systems: FW-S-0000-0999.
 2. Assembly Rating: 2 hours.
 3. Nominal Joint Width: As indicated.
 4. Movement Capabilities: Class II - 25 percent compression, extension, or horizontal shear.
 5. L-Rating at Ambient: As selected by Contractor to suit project conditions.
- D. Head-of-Wall, Fire-Resistive Joint Systems (for Fire-Resistive Roof Systems):
 1. UL-Classified Systems: HW-S-0000-0999.
 2. Assembly Rating: 2 hours.
 3. Nominal Joint Width: As indicated.
 4. Movement Capabilities: Class II - 25 percent compression or extension.
 5. L-Rating at Ambient: As selected by Contractor to suit project conditions.
- E. Head-of-Wall, Fire-Resistive Joint Systems (for Non-Fire-Resistive Roof Systems):
 1. UL-Classified Systems: CJ-S-0000-0999.
 2. Assembly Rating: 2 hours.
 3. Nominal Joint Width: As indicated.
 4. Movement Capabilities: Class II - 25 percent compression or extension.
 5. L-Rating at Ambient: As selected by Contractor to suit project conditions.
- F. Perimeter Fire-Resistive Joint Systems:
 1. UL-Classified Perimeter Fire-Containment Systems: CW-S-0000-0999.

2. Integrity Rating: 2 hours.
3. Insulation Rating: 1 hour.
4. Linear Opening Width: As indicated.
5. Movement Capabilities: Class II - 25 percent compression or extension.
6. L-Rating at Ambient Temperature: As selected by Contractor to suit project conditions.

END OF SECTION 078446

This page intentionally left blank

SECTION 079200 - JOINT SEALANTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Silicone joint sealants.
 - 2. Urethane joint sealants.
 - 3. Latex joint sealants.
 - 4. Polyurea joint sealants.
 - 5. Hybrid silicone sealants.
- B. Related Sections:
 - 1. Section 078413 "Penetration Firestopping" for sealing penetrations in fire-resistance-rated construction.
 - 2. Section 078446 "Fire-Resistive Joint Systems" for sealing joints in fire-resistance-rated construction.
 - 3. Section 088000 "Glazing" for glazing sealants.
 - 4. Section 092900 "Gypsum Board" for acoustical sealant and sealing acoustical joints.
 - 5. Division 32 Section "Concrete Paving Joint Sealants" for sealing joints in pavements, walkways, and curbing.

1.2 PRECONSTRUCTION TESTING

- A. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:
 - 1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
 - 2. Conduct field tests for each application indicated below:
 - a. Each kind of sealant and joint substrate in exterior walls.
 - b. Sealant around perimeter of exterior windows/storefront.
 - 3. Notify Architect seven days in advance of dates and times when test joints will be erected.
 - 4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
 - a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - 5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
 - 6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.
- D. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Preconstruction Field-Adhesion Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.
- C. Field-Adhesion Test Reports: For each sealant application tested.
- D. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.
- C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.
 - 1. Refer to Section 042000 "Unit Masonry" for sealant joint in masonry mockups.
- D. Preinstallation Conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 - 1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content: Sealants and sealant primers shall comply with the following:
 - 1. Architectural sealants shall have a VOC content of 250 g/L or less.
 - 2. Sealants and sealant primers for nonporous substrates shall have a VOC content of 250 g/L or less.
 - 3. Sealants and sealant primers for porous substrates shall have a VOC content of 775 g/L or less.
- C. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- D. Stain-Test-Response Characteristics: Where sealants are specified to be non-staining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- E. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- F. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.
- G. Keynote Designations: Refer to schedule at end of this Section for types and applicable substrates.
 - 1. Sealant: (079200.A01).
 - 2. Sealant with backer rod: (079200.A02).
 - 3. Acoustical sealant: (079200.A04): Refer to Section 092900.
 - 4. Tape Sealant (079200.A05).

2.2 SILICONE JOINT SEALANTS

- A. Single-Component, Non-Staining, Non-sag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 50 minimum, for Use NT.
 - 1. Products:
 - a. Tremco Incorporated; Spectrem 2.
 - b. Sika Products; Sikasil WS-295 FPS.
 - c. Dow; Dowsil 756 SMS Building Sealant.
 - d. Pecora; 890NST.
- B. Single-Component, Non-sag, Traffic-Grade, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use T.
 - 1. Products:
 - a. Dow; Dowsil 790 Silicone Building Sealant.
 - b. Sika Products; Sikasil 728 NS.
 - c. Pecora Corporation; 311 NS.
- C. Mildew-Resistant, Single-Component, Non-sag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25 minimum, for Use NT.
 - 1. Products:
 - a. Tremco Incorporated; Spectrem 2.
 - b. Sika Products; Sikasil GP.

2.3 URETHANE JOINT SEALANTS

- A. Multicomponent, Non-sag, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25 minimum, for Use NT.
 - 1. Products:
 - a. BASF Building Systems; Master Seal NP 2.
 - b. Tremco Incorporated; Dymonic 100.
 - c. Sika Products; Sikaflex; 2c NS EZ Mix.
 - d. Pecora Corporation; Dynatrol II.
- B. Multicomponent, Non-sag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25 minimum, for Use T.
 - 1. Products:
 - a. BASF Building Systems; Master Seal NP 2.
 - b. Tremco Incorporated; Dymonic 100.
 - c. Sika Products; Sikaflex; 2c NS EZ Mix.
 - d. Pecora Corporation; Dynatrol II.
- C. Multicomponent, Pourable, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type M, Grade P, Class 25 minimum, for Use T.
 - 1. Products:
 - a. BASF Building Systems; Master Seal SL 2.
 - b. Sika Products; Sikaflex; 2c SL.
 - c. Pecora Corporation; Dynatrol II SG.

2.4 LATEX JOINT SEALANTS

- A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Building Systems; Sonolac.
 - b. May National Associates, Inc.; Bondaflex Sil-A 700.
 - c. Pecora Corporation; AC-20+.
 - d. Tremco Incorporated; Tremflex 834.

2.5 POLYUREA SEALANTS

- A. Polyurea Sealant: Semi-rigid, self-leveling, 2-part type. Shore D hardness of 85 when tested in accordance with ASTM D 2240. Tensile strength of 1160 pounds per square inch when tested in accordance with ASTM D 412.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Curecrete Distribution Company, Inc.; Ashford Crete-Fill.
 - b. L&M Construction Chemical, Inc. Joint Tite 750.
 - c. Adhesives Technologies Corp.; Crackbond JF311.

2.6 HYBRID SILICONE SEALANTS FOR RESINOUS WALL TREATMENTS

- A. Basis of Design: Subject to compliance with requirements, provide one of products listed below or a comparable product, with the following product characteristics, submitted to and accepted by Architect.
 - 1. Products:
 - a. BASF; MasterSeal NP 100.
 - 2. Product Characteristics:
 - a. Classification: ASTM C920, Type S, Grade NS, Class 50, Use T.
 - b. Movement Capacity: +/- 50 percent.
 - c. Shore A Hardness: 17 to 23 per ASTM C 661.
 - d. Tensile Strength: 160-200 psi per ASTM D 412.
 - e. Tear Strength 22 lbs per inch per ASTM 1004.
 - f. Color: As selected by Architect from manufacturer's full range of custom options.

2.7 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are non-staining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings (079200.A04): ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape (079200.A05): 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. Provide self-adhesive tape where applicable.

2.8 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including 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. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.

- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. 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.
- C. 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.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
 - 4. As sealant work progresses, install tube weeps at 24 inches on center along base of metal wall panels and where indicated.
- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Non-sag Sealants: 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.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
 - 4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.

3.4 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
 - 1. Extent of Testing: Test completed and cured sealant joints as follows:
 - a. Perform one test for the first 1000 feet (300 m) of joint length for each kind of sealant and joint substrate.
 - 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.
 - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - 3. Inspect tested joints and report on the following:
 - a. Whether sealants filled joint cavities and are free of voids.
 - b. Whether sealant dimensions and configurations comply with specified requirements.
 - c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.

4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.
 5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
- B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

- A. Protect joint sealants 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.

3.7 JOINT-SEALANT SCHEDULE (079200.A01)

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
1. Joint Locations:
 - a. Isolation and contraction joints in cast-in-place concrete slabs.
 - b. Joints between different materials listed above.
 2. Urethane Joint Sealant: Multicomponent, pourable/non-sag, traffic grade, Class 25.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
 - a. Control and expansion joints in unit masonry.
 - b. Joints in formed metal wall panels.
 - c. Joints within and at perimeter of storefront and curtain wall assemblies.
 - d. Control and expansion joints.
 - e. Joints between different materials listed above.
 - f. Perimeter joints between materials listed above and frames of doors, windows and louvers.
 - g. Control and expansion joints in ceilings and other overhead surfaces.
 2. Silicone Joint Sealant: Single component, non-staining, non-sag, neutral curing, Class 50.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
1. Joint Locations:
 - a. Isolation joints in cast-in-place concrete slabs.
 - b. Other joints as indicated, except for expansion and control joints.
 2. Urethane Joint Sealant: Multicomponent, non-sag, traffic grade, Class 25.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
1. Joint Locations:
 - a. Expansion joints in tile and resinous flooring.
 2. Silicone Joint Sealant: Single component, non-sag, traffic grade, neutral curing, Class 100/50.
 3. Joint Sealant Color: As selected by Architect from manufacturer's full range of colors.
- E. Joint-Sealant Application: Interior control/contraction joints in horizontal traffic surfaces.

1. Joint Locations:
 - a. Control/contraction joints in concrete slabs indicated to receive sealed finish, polished concrete finish, resinous flooring and joints in slabs on grade extending to building exterior, seal watertight.
 2. Polyurea Joint Sealant: Polyurea, multi component, self-leveling, traffic grade.
 3. Joint Sealant Color: As selected by Architect from manufacturer's full range of colors.
- F. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings where indicated.
 - c. Vertical joints on exposed surfaces of interior unit masonry and concrete.
 2. Joint Sealant: Urethane, multicomponent, non-sag, Class 25, paintable.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- G. Joint Sealant Application: Interior joints in vertical surfaces.
1. Joint Locations:
 - a. Vertical joints in exposed surfaces of gypsum drywall partitions.
 - b. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
 2. Joint Sealant: Acrylic based, paintable.
 3. Joint Sealant Color: As selected by Architect from manufacturer's full range of colors.
- H. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Sealant Location:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Tile control and expansion joints where indicated.
 2. Joint Sealant: Single component, non-sag, mildew resistant, acid curing, Silicone.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- I. Joint-Sealant Application: Interior control/contraction joints in vertical surfaces (Resinous Wall treatments)
1. Joint Locations:
 - a. Control and expansion joints in CMU, cement board, or gypsum board indicated to receive resinous wall treatment.
 2. Joint Sealant: Hybrid Silicone, single component, non-sag, Class 50, traffic grade.
 3. Joint Sealant Color: As selected by Architect from manufacturer's full range of custom colors.

END OF SECTION 079200

SECTION 079500 - EXPANSION CONTROL

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Exterior wall expansion control systems.
 - 2. Interior expansion control systems.
- B. Related Requirements:
 - 1. Section 012300 "Alternates" for alternates affecting the work of this Section.
 - 2. Section 078446 "Fire-Resistive Joint Systems" for liquid-applied joint sealants in fire-resistive building joints.
 - 3. Section 079200 "Joint Sealants" for liquid-applied joint sealants and for elastomeric sealants without metal frames.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for expansion joint cover assemblies.
- B. Shop Drawings: For each expansion control system specified. Include plans, elevations, sections, details, splices, attachments to other work, and line diagrams showing entire route of each expansion control system. Where expansion control systems change planes, provide isometric or clearly detailed drawing depicting how components interconnect.
- C. Samples for Initial Selection: For each type of expansion control system indicated.
 - 1. Include manufacturer's color charts showing the full range of colors and finishes available for each exposed metal and elastomeric seal material.
- D. Product Schedule: Prepared by or under the supervision of the supplier. Include the following information in tabular form:
 - 1. Manufacturer and model number for each expansion control system.
 - 2. Expansion control system location cross-referenced to Drawings.
 - 3. Nominal joint width.
 - 4. Movement capability.
 - 5. Materials, colors, and finishes.
 - 6. Product options.
 - 7. Fire-resistance ratings.
- E. Samples for Initial Selection: For each type of exposed finish.
 - 1. Include manufacturer's color charts showing the full range of colors and finishes available for each exposed metal and elastomeric-seal material.
- F. Samples for Verification: For each type of expansion joint cover assembly, full width by 6 inches long in size.

1.3 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each fire barrier provided as part of an expansion control system, for tests performed by a qualified testing agency.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. General: Provide expansion control systems of design, basic profile, materials, and operation indicated. Provide units with capability to accommodate variations in adjacent surfaces.
 - 1. Furnish units in longest practicable lengths to minimize field splicing. Install with hairline mitered corners where expansion control systems change direction or abut other materials.
 - 2. Include factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous expansion control systems.
- B. Coordination: Coordinate installation of exterior wall expansion control systems with roof expansion control systems to ensure that wall transitions are watertight. Roof expansion joint assemblies are specified elsewhere.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: Where indicated, provide expansion control systems with fire barriers identical to those of systems tested for fire resistance per UL 2079 or ASTM E 1966 by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Hose Stream Test: Wall-to-wall and wall-to-ceiling systems shall be subjected to hose stream testing.

2.3 INTERIOR EXPANSION CONTROL SYSTEMS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated or a comparable product by one of the following:
 - 1. Balco, Inc.
 - 2. Construction Specialties, Inc.
 - 3. JointMaster/InPro Corporation.
 - 4. InPro Architectural Products.
 - 5. MM Systems Corporation.
 - 6. Nystrom, Inc.
 - 7. Watson Bowman Acme Corp.; a BASF Construction Chemicals business.
- B. Source Limitations: Obtain expansion control systems from single source from single manufacturer.
- C. Floor-to-floor (079500.A01)
 - 1. Basis-of-Design Product: Balco, 75FCE-1 Series Floor Expansion Joint Covers.
 - 2. Design Criteria:
 - a. Nominal Joint Width: 1 inch
 - b. Movement Capability: -25 percent/+25 percent, minimum.
 - c. Fire-Rated Assemblies: Where expansion joints occur in fire-rated wall, provide Pyro-Seal as recommended by manufacturer to suit rating and joint design. System shall be UL listed and tested.
 - 3. Type: Surface-mounted Joint System for overlapping floor finishes on each side.
 - a. Metal Retainer: Aluminum.
 - 1) Finish: Manufacturer's standard.
 - b. Cover Plate Material: Aluminum.
 - 1) Color: As selected by Architect from manufacturer's full range of custom options.
- D. Wall-to-Wall and Ceiling Joints (079500.A06) and (079500.A08):
 - 1. Basis-of-Design Product: Balco Glide Plate Series, Model 6TW-1, Surface mounted seal expansion joint.
 - 2. Design Criteria:
 - a. Nominal Joint Width: 1 inches.
 - b. Movement Capability: +/-50 percent to +/- 100percent Expansion/Contraction
 - c. Type of Movement: Thermal.
 - 3. Type: Surface-Mounted.
 - a. Metal Retainers/Bases: Aluminum.
 - 1) Finish: Manufacturer's standard.
 - b. Seal Material: Directionally sanded aluminum plate.

- 1) Color: As selected by Architect from full range of manufacturers standard colors.

2.4 MATERIALS

- A. Aluminum: ASTM B221, Alloy 6063-T5 for extrusions; ASTM B209, Alloy 6061-T6 for sheet and plate.
 1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.
- B. Elastomeric Seals: Manufacturer's standard preformed elastomeric membranes or extrusions to be installed in metal frames.
- C. Cellular Foam Seals: Extruded, compressible foam designed to function under compression.
- D. Accessories: Manufacturer's standard adhesives, and other accessories compatible with material in contact, as indicated or required for complete installations.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine surfaces where expansion control systems will be installed for installation tolerances and other conditions affecting performance of work.
 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Prepare substrates according to expansion joint cover assembly manufacturer's written instructions.
- B. Coordinate and furnish anchorages, setting drawings, and instructions for installing expansion joint cover assemblies. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of expansion joint cover assemblies.

3.3 INSTALLATION

- A. Comply with manufacturer's written instructions for storing, handling, and installing expansion control systems and materials unless more stringent requirements are indicated.
- B. Metal Frames: Perform cutting, drilling, and fitting required to install expansion joint cover assemblies.
 1. Install frames in continuous contact with adjacent surfaces.
 - a. Shimming is not permitted.
 2. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
 3. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation.
 4. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
 5. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.
- C. Seals: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.
 1. Provide in continuous lengths for straight sections.
 2. Seal transitions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
 3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.
- D. Install with hairline mitered corners where expansion joint cover assemblies change direction or abut other materials.

- E. Foam Seals: Install with adhesive recommended by manufacturer.
- F. Terminate exposed ends of expansion control systems with field- or factory-fabricated termination devices.

3.4 PROTECTION

- A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.
- B. Protect the installation from damage by work of other Sections. Where necessary due to heavy construction traffic, remove and properly store cover plates or seals and install temporary protection over expansion control systems. Reinstall cover plates or seals prior to Substantial Completion of the Work.

END OF SECTION 079500

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes hollow-metal work.
 - 1. Interior heavy-duty hollow-metal door (081113.A01).
 - 2. Hollow-metal frame (081113.A31).
- B. Related Requirements:
 - 1. Section 012300 "Alternates" for alternates effecting work of this Section.
 - 2. Section 042000 "Unit Masonry" for embedding anchors for hollow-metal work into masonry.
 - 3. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.
 - 4. Section 099123 "Interior Painting" for field painting of hollow-metal work.
 - 5. Section 099600 "High Performance Coatings" for field painting of hollow metal work.
 - 6. Division 26 Sections for electrical connections including conduit and wiring for door controls and operators.

1.2 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.3 COORDINATION

- A. Coordinate anchorage installation 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.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, temperature-rise ratings, and finishes.
- B. Shop Drawings: Include the following:
 - 1. Furnish a schedule of doors and frames using same reference numbers for details and openings as those on Drawings.
 - 2. Elevations of each door type.
 - 3. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
 - 4. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 5. Locations of reinforcement and preparations for hardware.
 - 6. Details of each different wall opening condition.
 - 7. Details of anchorages, joints, field splices, and connections.
 - 8. Details of accessories.
 - 9. Details of moldings, removable stops, and glazing.
 - 10. Details of conduit and preparations for power, signal, and control systems.
- C. Samples for Verification:
 - 1. For each type of exposed finish required, prepared on Samples of not less than 6 by 8 inches.

- D. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

1.6 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.
- B. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic.
 - 1. Provide additional protection to prevent damage to factory-finished units.
 - 2. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jams and mullions.
- B. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch-high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.8 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Hope's Windows, Inc.
 - 2. Ceco Door Products; an Assa Abloy Group company.
 - 3. Curries Company; an Assa Abloy Group company.
 - 4. Republic Doors and Frames.
 - 5. Steelcraft; an Allegion company.
 - 6. Elco Manufacturing Inc.
 - 7. HMF Express.
 - 8. Southwestern Hollow Metal.
 - 9. Steward Steel Inc.
 - 10. West Central Manufacturing.
- B. Basis-of-Design for Fire-Rated Vision Light Frames: Subject to compliance with requirements, provide Anemostat Door Products; Model "BR-7" bullet and impact resistant metal vision frames.
 - 1. Comparable products from other manufacturers, meeting specified requirements, will be considered when submitted to and accepted by Architect prior to bidding.
- C. Source Limitations:
 - 1. Obtain hollow-metal work from single source from single manufacturer.
 - 2. Obtain fire-rated vision light frames, other than those integral with the hollow metal door, from single source from single manufacturer.

2.2 REGULATORY REQUIREMENTS

- A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings and temperature-rise limits indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
 - 1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.
 - 2. For areas required to receive a fire rating greater than 45 minutes, fire testing shall be based on fire resistive criteria according to NFPA 251 or ASTM E119.
- B. Fire-Rated, Borrowed-Lite Assemblies: Complying with NFPA 80 and 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.
 - 1. For areas required to receive a fire rating of 45 minutes or greater, fire testing shall be based on fire resistive criteria according to NFPA 251 or ASTM E119.

2.3 INTERIOR DOORS AND FRAMES

- A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Heavy-Duty Doors and Frames: SDI A250.8, Level 2.
 - 1. Physical Performance: Level B according to SDI A250.4.
 - 2. Doors (081113.A01):
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1-3/4 inches.
 - c. Face: Uncoated, cold-rolled steel sheet, minimum thickness of 0.042 inch (18 gauge).
 - 1) Provide metallic-coated cold rolled steel in areas exposed to moisture and as indicated on Drawings.
 - d. Edge Construction: Model 1, Full Flush.
 - e. Core: Manufacturer's standard kraft-paper honeycomb for non-fire-rated doors and mineral-board for fire-rated doors.
 - f. Core: Manufacturers standard vertical steel stiffener.
 - g. Openings in door for vision lites shall be reinforced with manufacturer's recommended steel reinforcement channels at perimeter of vision lite opening.
 - 3. Frames (081113.A31):
 - a. Materials: Uncoated, steel sheet, minimum thickness of 0.067 inch (14 gauge).
 - 1) Provide metallic-coated cold rolled steel in areas exposed to moisture and as indicated on Drawings.
 - b. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
 - c. Construction: Face welded.
 - d. Reinforcement: Provide high frequency hinge reinforcement at top hinge location.
 - 4. Vision Lites:
 - a. For non-fire-rated glass, provide the following:
 - 1) Manufacturer's "flush" type vision lights.
 - b. For fire-rated security glass, provide vision light kit specified.
 - 5. Exposed Finish: Prime.

2.4 BORROWED LITES

- A. Hollow-metal frames of uncoated steel sheet, minimum thickness of 0.053 inch (16 gauge).
- B. Construction: Face welded.

2.5 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. General: Anchors for severe storm-resistant door and frame assemblies shall be of sufficient length to provide not less than 5 inches of embedment into adjacent wall construction at jamb.
 - 2. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
 - 3. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
 - 4. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
 - 5. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
- B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:
 - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.6 MATERIALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
- D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z 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: Hot-dip galvanized according to ASTM A 153/A 153M.
- F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- G. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.
- H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
- I. Glazing: Comply with requirements in Section 088000 "Glazing."
- J. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.7 FABRICATION

- A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Hollow-Metal Doors:
 - 1. Fire Door Cores: As required to provide fire-protection and temperature-rise ratings indicated.
 - 2. Vertical Edges for Single-Acting Doors: Bevel edges 1/8 inch in 2 inches.

3. Top Edge Closures: Close top edges of doors with inverted closures, except provide flush closures at exterior doors of same material as face sheets.
 4. Top Edge Closures: Close top edges of doors with flush top seamless.
 5. Bottom Edge Closures: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets.
 6. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.
 7. Reinforcement at Vision Lights: Where fire-rated security glass is indicated for vision lights, provide steel channel reinforcement around inside perimeter of vision light opening as standard by door manufacturer.
- C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
1. Sidelite and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
 5. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:
 - 1) Two anchors per jamb up to 60 inches high.
 - 2) Three anchors per jamb from 60 to 90 inches high.
 - 3) Four anchors per jamb from 90 to 120 inches high.
 - 4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
 - b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.
 - 4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - c. Compression Type: Not less than two anchors in each frame.
 - d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
 6. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.
- E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
 2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.
 3. Provide high frequency hinge reinforcement on top hinge only (two additional 10 gauge reinforcements are welded at 3 places each) on all door frames.
- F. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with butted hairline joints.
1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
 3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 4. Vision lights shall be "flush" type, without through-bolts, except for vision lights associated with fire-rated security glass as specified in Article 2.8 below.
 5. Provide loose stops and moldings on inside of hollow-metal work.
 6. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.8 STEEL FINISHES

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

2.9 ACCESSORIES

- A. Louvers (081113.A35): Provide louvers for interior doors, where indicated, which comply with SDI 111C, with blades or baffles formed of 0.020-inch-thick, cold-rolled steel sheet set into 0.032-inch-thick steel frame.
 - 1. Sightproof Louver: Stationary louvers constructed with inverted-V or inverted-Y blades.
 - 2. Fire-Rated Automatic Louvers: 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 qualified testing and inspecting agency that established fire-resistance rating of door assembly.
- B. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
- C. Provide high frequency hinge reinforcement on top hinge only (two additional 10 gauge reinforcements are welded at 3 places each) on all door frames.
- D. Reinforce doors and frames to receive continuous hinges where scheduled.

3.3 INSTALLATION

- A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.
- B. Hollow-Metal Frames: Install hollow-metal frames for doors, transoms, sidelites, borrowed lites, and other openings, of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.
 - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-rated openings, install frames according to NFPA 80.

- b. 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.
 - c. Install frames with removable stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.
 - 1) Provide mortar guards for hinge and strike plate cutouts and any electrical components attached to frames.
 - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - g. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.
- 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
- 3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
- 4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
- 5. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.
- 6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
- 7. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
- 8. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
 - 1. Non-Fire-Rated Steel Doors:
 - a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
 - c. At Bottom of Door: 5/8 inch plus or minus 1/32 inch.
 - d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.
 - 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
 - 3. Smoke-Control Doors: Install doors and gaskets according to NFPA 105.
- D. Vision Light Frames for Fire-Rated Security Glass: Install in strict accordance with vision light manufacturer's written instructions to accommodate glass thicknesses indicated and to meet performance requirements indicated.
- E. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.
 - 1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow-metal work immediately after installation.

- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113

SECTION 081416 - FLUSH WOOD DOORS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Solid-core doors with wood-veneer faces (081416.A01 – **Type A1, B1, E1**).
- B. Related Requirements:
 - 1. Section 012300 "Alternates" for those alternates affecting work of this Section.
 - 2. Section 064023 "Interior Architectural Woodwork" for application of markerboard laminate and edge banding to wood doors.
 - 3. Section 081113 "Hollow Metal Doors and Frames" for hollow metal frames.
 - 4. Section 087100 "Door Hardware" for hardware in flush wood doors.
 - 5. Section 088000 "Glazing" for glass view panels in flush wood doors.
 - 6. Section 099123 "Interior Painting" for field finishing doors.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of door. Include details of core and edge construction and trim for openings. Include factory-finishing specifications.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:
 - 1. Dimensions and locations of blocking.
 - 2. Dimensions and locations of mortises and holes for hardware.
 - 3. Dimensions and locations of cutouts.
 - 4. Undercuts.
 - 5. Requirements for veneer matching.
 - 6. Doors to be factory finished and finish requirements.
 - 7. Fire-protection ratings for fire-rated doors.
- C. Samples for Initial Selection: For
 - 1. Factory finished doors.
- D. Samples for Verification:
 - 1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish.
 - a. For each wood species and transparent finish, provide set of three Samples showing typical range of color and grain to be expected in finished Work.
 - 2. Louver blade and frame sections, 6 inches long, for each material and finish specified.
 - 3. Frames for light openings, 6 inches long, for each material, type, and finish required.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.
- B. Certificates: For door manufacturer as set forth in Quality Assurance article.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is a certified participant in AWI's Quality Certification Program.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
 - 1. Do not deliver doors until building interior environmental conditions are maintained to meet Manufacturer's requirements for relative humidity.
- B. Package doors individually in plastic bags or cardboard cartons.
 - 1. Protect doors in place as necessary to prevent scratches, dents, and other damage.
- C. Mark each door on bottom rail with opening number used on Shop Drawings.
- D. Do not place other items on top of stored doors.
- E. Do not drag doors across one another or across other surfaces.
- F. Handle doors using clean gloves.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during remainder of construction period.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
 - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
 - 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 - 3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements provide products by one of the following:
 - 1. Algoma / Graham / Marshfield / Mohawk / Masonite Architectural Doors.
 - 2. Eggers Industries.
 - 3. Oshkosh Door Company.
 - 4. VT Industries, Inc.
 - 5. Western Oregon Doors.
- B. Source Limitations: Obtain flush wood doors from single manufacturer.

2.2 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, "Architectural Wood Flush Doors."
 - 1. Provide labels indicating that doors comply with requirements of grades specified.
 - 2. 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.
- B. Regional Materials: Wood doors shall be manufactured within 100 miles (160 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles (160 km) of Project site.
- C. Certified Wood: Wood doors shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001 and FSC STD-40-004.
- D. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- E. Composite Wood Products: Products shall be made using ultra-low-emitting formaldehyde resins as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or shall be made with no added formaldehyde.
- F. WDMA I.S.1-A Performance Grade:
 - 1. Extra Heavy Duty.
- G. Fire-Rated Wood Doors: Doors 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.
 - 2. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
 - 3. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
 - 4. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
 - 5. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
- H. Smoke-and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.
- I. Particleboard-Core Doors:
 - 1. Particleboard: ANSI A208.1, Grade LD-2.
 - a. Provide with binder containing no urea-formaldehyde
 - 2. Blocking: Provide wood blocking in particleboard-core doors as follows:
 - a. 5-inch top-rail blocking, in doors indicated to have closers.
 - b. 5-inch bottom-rail blocking, in exterior doors and doors indicated to have kick, mop, or armor plates.
 - 3. Provide doors with structural-composite-lumber cores instead of particleboard cores for doors indicated to receive exit devices.
- J. Heavy Duty Particleboard-Core Doors:
 - 1. PC-5 Bonded 5-ply Wood Based Particleboard Core Doors shall meet the WDMA Extra Heavy Duty Performance Level unless noted otherwise.
 - a. Provide with binder containing no urea-formaldehyde
- K. Structural-Composite-Lumber-Core Doors:
 - 1. Structural Composite Lumber: WDMA I.S.10.
 - a. Screw Withdrawal, Face: 700 lbf.

- b. Screw Withdrawal, Edge: 400 lbf.
- L. 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 composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as follows:
 - a. 5-inch top-rail blocking.
 - b. 5-inch bottom-rail blocking, in doors indicated to have protection plates.
 - c. 5-inch midrail blocking, in doors indicated to have armor plates.
 - d. 5-inch midrail blocking, in doors indicated to have exit devices.
 - 3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
 - a. Screw-Holding Capability: 550 lbf per WDMA T.M.-10.

2.3 VENEER-FACED DOORS FOR TRANSPARENT FINISH

- A. Interior Solid-Core Doors (081416.A01 – **Type A1, B1 E1**):
 - 1. Grade: Premium, with Grade A faces.
 - 2. Species:
 - a. Match species of existing wood doors at each location as determined by Architect and Owner from manufacturer's full range of options.
 - 3. Cut:
 - a. Match cut of existing wood doors at each location as determined by Architect and Owner from manufacturer's full range of options.
 - 4. Match between Veneer Leaves:
 - a. Book match.
 - b. Match veneer matching of existing doors at project site.
 - 5. Assembly of Veneer Leaves on Door Faces: Running match.
 - 6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
 - 7. Exposed Vertical and Top Edges: Same species as faces - edge Type A.
 - a. Stile edges shall be 2-ply, not less than 1-3/8 inch thick. Outer hardwood edge ply shall be 5/8 inch thick. Inner ply shall be structural composite lumber or hardwood. Stile edges shall be continuous and shall not be finger jointed.
 - 8. Core: Particleboard or structural composite lumber.
 - 9. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering. Faces are bonded to core using a hot press.
 - a. MDF cross bands are not acceptable.
 - 10. Color:
 - a. Stains shall be custom-mixed to match Architect's sample and selections.
 - b. Match color of existing wood doors at each location as determined by Architect and Owner from manufacturer's full range of options.
 - 11. Doors thickness for the sliding barn doors shall be 1-3/8 inches.

2.4 LIGHT FRAMES AND LOUVERS

- A. General: Light frames are to match light frames in existing doors for each school. Contractor shall field verify material type and profile for light frames.
- B. Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch-thick, cold-rolled steel sheet; with baked-enamel- or powder-coated finish.
 - 1. Colors to be selected by Architect from full range of manufacturer's options.
 - 2. Fire Rated Doors: Products shall be listed and labeled for use in doors with fire protection rating required on doors schedule on Drawings.
- C. Metal Louvers:
 - 1. Blade Type: Vision-proof, inverted Y.
 - 2. Metal and Finish: Hot-dip galvanized steel, 0.040 inch thick, with baked-enamel- or powder-coated finish.

- D. Louvers for Fire-Rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire-protection rating of 1-1/2 hours and less.
 - 1. Metal and Finish: Hot-dip galvanized steel, 0.040 inch thick, with baked-enamel- or powder-coated finish.
 - 2. Fire Rated Doors: Products shall be listed and labeled for use in doors with fire protection rating required on doors schedule on Drawings.

2.5 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
 - 1. Comply with NFPA 80 requirements for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
 - 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
- C. Transom and Side Panels: Fabricate matching panels with 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 styles.
 - 1. Fabricate door and transom panels with full-width, solid-lumber meeting rails. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.
- D. Openings: Factory cut and trim openings through doors.
 - 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 Section 088000 "Glazing."
 - 3. Louvers: Factory install louvers in prepared openings.

2.6 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 - 1. Finish two faces, two vertical edges, edges of cutouts, and mortises. Stains and fillers may be omitted on bottom edges, edges of cutouts, and mortises.
 - a. Where top edge is visible from an upper level (occupiable space) top edge shall be finished.
- B. Factory finish doors that are indicated to receive transparent finish.
- C. Transparent Finish:
 - 1. General: Intent is to match Architect's control sample.
 - 2. Grade: Premium.
 - 3. Finish: Provide one of the following finishes:
 - a. AWI's "Architectural Woodwork Standards" System 10, UV curable, water based polyurethane.
 - b. WDMA TR-6 catalyzed polyurethane.
 - 4. Staining: Custom, to match Architect's control sample.
 - 5. Effect: Semifilled finish, produced by applying an additional finish coat to partially fill the wood pores.
 - 6. Sheen: Satin.
- D. Opaque Finish: Refer to Section 099123 "Interior Painting" and Section 099600 "High Performance Coatings" for painting of flush wood doors.
- E. Use only paints and coatings that 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."

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
 - 1. Verify that installed 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.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, see Section 087100 "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
 - 1. Install fire-rated doors according to NFPA 80.
 - 2. Install smoke- and draft-control doors according to NFPA 105.
 - 3. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.
 - a. Comply with NFPA 80 for fire-rated doors.
 - b. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 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.

END OF SECTION 081416

SECTION 081433 - STILE AND RAIL WOOD DOORS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior stile and rail wood doors (081433.A01 - Type F1).
 - 2. Interior fire rated stile and rail wood doors.
 - 3. Finishing stile and rail wood doors.
 - 4. Fitting stile and rail wood doors to frames and machining for hardware.
 - 5. Interior wood door frames (081433.A02).
- B. Related Requirements:
 - 1. Section 087100 "Door Hardware" for hardware in flush wood doors.
 - 2. Section 088000 "Glazing" for door lites.
 - 3. Section 099300 "Staining and Transparent Finishing" for finishing of wood doors.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include details of construction and glazing.
 - 2. Include factory-finishing specifications.
- B. Shop Drawings: For stile and rail wood doors and frames. Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data, including those for stiles, rails, panels, moldings (sticking), and casings; and other pertinent data, including the following:
 - 1. Dimensions of doors for factory fitting.
 - 2. Locations and dimensions of mortises and holes for hardware.
 - 3. Undercuts.
 - 4. Doors to be factory finished and finish requirements.
 - 5. Fire-protection ratings for fire-rated doors.
 - 6. Casing profiles.
- C. Samples for Initial Selection:
 - 1. For factory-finished doors.
 - 2. For wood door frame profiles.
- D. Samples for Verification:
 - 1. Corner sections of doors, approximately 8 by 10 inches, with door faces and edgings representing typical range of color and grain for each species of veneer and solid lumber required. Finish Sample with same materials proposed for factory-finished doors.
 - 2. Minimum 6 inch long casing profile.

1.3 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of door, from manufacturer.
- B. Sample Warranty: For special warranty.
- C. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in opaque plastic bags or cardboard cartons.

- C. Mark each door on bottom rail with opening number used on Shop Drawings.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until 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.

1.6 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship, or have warped (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section, within specified warranty period.
 - 1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 - a. Mineral Core 45 min. rated – 5-year warranty.
 - b. Standard Stile and Rail Door – Lifetime warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of stile and rail wood door from single manufacturer.

2.2 MATERIALS

- A. General: Use only materials that comply with referenced standards and other requirements specified.
 - 1. Assemble interior doors, including components, with either dry-use or wet-use adhesives complying with ASTM D 5572 for finger joints and with ASTM D 5751 for joints other than finger joints.
- B. Panel Products: Any of the following unless otherwise indicated:
 - 1. Particleboard: ANSI A208.1, Grade M-2.
 - 2. Medium-density fiberboard, complying with ANSI A208.2, Grade 130.

2.3 INTERIOR STILE AND RAIL WOOD DOORS

- A. Interior Stile and Rail Wood Doors: Interior doors complying with WDMA I.S.6, "Industry Standard for Wood Stile and Rail Doors," and with other requirements specified.
 - 1. Basis of Design: Subject to compliance with requirements, provide "Stile and Rail - Aspiro Series" by Masonite Architectural or a comparable product submitted to and accepted by Architect prior to bidding with the following product characteristics. Profile of doors to match existing.
 - 2. Finish: Transparent to match architects control sample. Color to be selected by architect from manufacturers full range.
 - 3. Species: Red Oak, quarter sawed/sliced.
 - 4. Grade: Transparent and Premium.
 - 5. Solid Panel Construction: Raised panels shall be minimum thickness of 1-1/8" with raised of panel of solid lumber material matching face species, rim banded with mitered corners. provide as selected by Architect. Stiles and rails shall be constructed of Structural Composite Lumber (SCL) with a minimum 3/4" solid hardwood edge.
 - 6. To match existing construction.
 - 7. Glass: As indicated on Drawings and Section 088000 "Glazing"
 - 8. Mark, label, or otherwise identify stile and rail wood doors as complying with WDMA I.S.6 and grade specified. Include panel design number if applicable.

2.4 INTERIOR FIRE-RATED, STILE AND RAIL WOOD DOORS

- A. Fire-Rated Wood Doors: Doors 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.
 - 1. Temperature-Rise Limit: Where indicated, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.
 - 2. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
 - 3. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
 - 4. Pairs: Provide formed-steel edges and astragals with intumescent seals.
 - a. Finish steel edges and astragals with baked enamel same color as doors.
 - b. Finish steel edges and astragals to match door hardware (locksets or exit devices).
- B. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.
- C. Interior Fire-Rated Stile and Rail Wood Doors: Fire-rated (45-minute rating) doors complying with the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards," and with other requirements specified.
 - 1. Basis of Design: Subject to compliance with requirements, provide "Marshfield-Algoma Carte Blanche Series" by Masonite Architectural or a comparable product submitted to and accepted by Architect prior to bidding with the following product characteristics. Profile of doors to match existing.
 - 2. Panel Designs: Indicate on Drawings. 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.
 - 3. Finish: Transparent to match architects control sample. Color to be selected by architect from manufacturers full range.
 - 4. Species: Red Oak, quarter sawed/sliced.
 - 5. Grade: Transparent and Premium.
 - 6. Interior Fire-Rated Door Construction: 1-3/4-inch-thick, edged and veneered mineral-core stiles and rails and 1-1/8-inch-thick, veneered mineral-core raised panels.
 - 7. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
 - a. Screw-Holding Capability: 550 lbf per WDMA T.M.-10.
 - 8. Stile and Rail Widths: To match existing.
 - 9. Molding Profile (Sticking): To match existing.
 - 10. Provide AWI Quality Certification Labels indicating that doors comply with requirements of grades specified.

2.5 STILE AND RAIL WOOD DOOR FABRICATION

- A. Fabricate stile and rail wood doors in sizes indicated for field fitting.
- B. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels unless otherwise indicated:
 - 1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/2 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide not more than 3/8 inch from bottom of door to top of threshold.
 - 2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
- C. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
 - 1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.
- D. Glazed Openings: Trim openings indicated for glazing with solid wood moldings, with one side removable. Miter wood moldings at corner joints.

2.6 FINISHING

- A. Finish wood doors at factory.
- B. For doors indicated to be shop finished, comply with the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards," WDMA I.S.6A, "Industry Standard for Architectural Stile and Rail Doors," and with other requirements specified.
 - 1. Finish faces and all four edges of doors, including mortises and cutouts. Stains and fillers may be omitted on bottom edges, edges of cutouts, and mortises.
 - 2. Color: Match architects control sample, to be selected from manufactures full range.
 - 3. Sheen: Satin.

2.7 INTERIOR WOOD DOOR FRAMES

- A. Basis of Design: Subject to compliance with requirements, provide "Custom Double Rabbet Jamb with Casing" by Masonite Architectural or a comparable product submitted to and accepted by Architect prior to bidding with the following product characteristics. Profile of casing to match existing.
 - 1. Material: Solid lumber to match species of door veneer.
 - 2. Frame Profile: Double Rabbet
 - 3. Trim: Solid lumber to match species of door veneer.
 - 4. Trim Style: Profile of casing as indicated on Drawings.
 - 5. Fire Rating: Where indicated, match rating of door.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
 - 1. Verify that installed 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.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, see Section 087100 "Door Hardware."
- B. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 - 1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/2 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated.
 - 2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
- C. Shop-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081433 081433

SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Access doors and frames for walls and ceilings (083113.A01).
- B. Related Requirements:
 - 1. Section 042000 "Unit Masonry" for coordinating doors and frames set in masonry.
 - 2. Section 077200 "Roof Accessories" for roof hatches.
 - 3. Section 233300 "Air Duct Accessories" for heating and air-conditioning duct access doors.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, fire ratings, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, details, and attachments to other work.
 - 2. Detail fabrication and installation of access doors and frames for each type of substrate.
- C. Product Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Access Doors and Frames: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection and temperature-rise limit ratings indicated, according to NFPA 252 or UL 10B.

2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Babcock-Davis.
 - 2. J. L. Industries, Inc.; Div. of Activar Construction Products Group.
 - 3. Karp Associates, Inc.
 - 4. Larsen's Manufacturing Company.
 - 5. Milcor Inc.
 - 6. Nystrom, Inc.
- B. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.
- C. Flush Access Doors with Exposed Flanges (083113.A01 – Type 1):
 - 1. Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standard-width exposed flange, proportional to door size.
 - 2. Locations: Wall and ceiling.
 - 3. Door Sizes:
 - a. 24" x 24" unless otherwise specified.
 - b. 12" x 12" where indicated for access to water shut-off valves.
 - 4. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage.

- a. Finish: Factory prime.
- 5. Metallic-Coated Steel Sheet for Door: Provide in restrooms and other wet areas. Nominal 0.064 inch, 16 gage.
 - a. Finish: Factory prime.
- 6. Frame Material: Same material, thickness, and finish as door.
- 7. Hinges: Manufacturer's standard.
- 8. Hardware: Provide hardware as follows:
 - a. At non-public spaces provide latching hardware.
 - b. At public spaces accessible to students, provide locking hardware.
- D. Recessed Access Doors with Concealed Flanges (083113.A01 – Type 2):
 - 1. Description: Door face recessed 5/8 inch for gypsum board infill; with concealed flange for gypsum board installation and concealed hinge.
 - 2. Locations: Wall and ceiling.
 - 3. Door Sizes:
 - a. 24" x 24" unless otherwise specified.
 - b. 12" x 12" where indicated for access to water shut-off valves.
 - 4. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage, factory primed.
 - 5. Metallic-Coated Steel Sheet for Door: Provide in restrooms and other wet areas. Nominal 0.064 inch, 16 gage, factory primed.
 - 6. Hinges: Manufacturer's standard.
 - 7. Hardware: Provide hardware as follows:
 - a. At non-public spaces provide latching hardware.
 - b. At public spaces accessible to students, provide locking hardware.
- E. Fire-Rated, Flush Access Doors with Exposed Flanges:
 - 1. Assembly Description: Fabricate door to fit flush to frame, with a core of mineral-fiber insulation enclosed in sheet metal. Provide self-latching door with automatic closer and interior latch release. Provide manufacturer's standard-width exposed flange, proportional to door size.
 - 2. Locations: Wall and ceiling.
 - 3. Door Sizes:
 - a. 24" x 24" unless otherwise specified.
 - b. 12" x 12" where indicated for access to water shut-off valves.
 - 4. Fire-Resistance Rating: Not less than that of adjacent construction.
 - 5. Temperature-Rise Rating: 450 deg F at the end of 30 minutes.
 - 6. Uncoated Steel Sheet for Door: Nominal 0.036 inch, 20 gage.
 - a. Finish: Factory prime.
 - 7. Metallic-Coated Steel Sheet for Door: Provide in restrooms and other wet areas. Nominal 0.064 inch, 16 gage.
 - a. Finish: Factory prime.
 - 8. Metallic-Coated Steel Sheet for Door: Provide in restrooms and other wet areas. Nominal 0.040 inch, 20 gage.
 - a. Finish: Factory prime.
 - 9. Frame Material: Same material, thickness, and finish as door.
 - 10. Hinges: Manufacturer's standard.
 - 11. Hardware: Provide hardware as follows:
 - a. At non-public spaces provide latching hardware.
 - b. At public spaces accessible to students, provide locking hardware.
- F. Hardware:
 - 1. Latch: Cam latch operated by screwdriver.
 - 2. Lock: Cylinder.

2.3 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.

- D. Frame Anchors: Same type as door face.
- E. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.4 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 doors to types of supports indicated.
 - 1. For concealed flanges with drywall bead, provide edge trim for gypsum panels securely attached to perimeter of frames.
- D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling. Provide access sleeves for each latch operator and install in holes cut through finish.
- E. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
 - 1. For cylinder locks, furnish two keys per lock and key all locks alike.

2.5 FINISHES

- 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.
- D. Steel and Metallic-Coated-Steel Finishes:
 - 1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that rough openings are correctly sized and located.
- B. Begin installation only after substrates have been properly prepared.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to proceeding with this work.
- B. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

3.3 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Position units to provide convenient access to concealed equipment when necessary.
- C. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.4 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 083113

SECTION 083326 - OVERHEAD COILING GRILLES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Open-curtain overhead coiling grilles (083326.A01).
- B. Related Sections:
 - 1. Section 055000 "Metal Fabrications" for miscellaneous steel supports.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type and size of overhead coiling grille and accessory. Include the following:
 - 1. Construction details, material descriptions, dimensions of individual components, profiles for curtain components, and finishes.
 - 2. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments/mounting details to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
 - 3. Show locations of controls, locking devices, and other accessories.
 - 4. Wiring Diagrams: For power, signal, and control wiring.
- C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.
 - 1. Include similar Samples of accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish on the following components, in manufacturer's standard sizes:
 - 1. Open-curtain grille with full-size components consisting of rods, spacers, and links as required to illustrate each assembly.
 - 2. Bottom bar.
 - 3. Guides.
 - 4. Mounting frame.
 - 5. Brackets.
 - 6. Hood

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Sample Warranty: For special warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For overhead coiling grilles to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.

- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC A117.1.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.6 COORDINATION

- A. Coordinate work of this Section with other operations and installation of adjacent finish materials to avoid damage to installed materials.

1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of grilles that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS, GENERAL

- A. Source Limitations: Obtain overhead coiling grilles from single source from single manufacturer.
 - 1. Obtain operators and controls from overhead coiling grille manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Operation Cycles: Provide overhead coiling grille components and operators capable of operating for not less than number of cycles indicated for each grille. One operation cycle is complete when a grille is opened from the closed position to the fully open position and returned to the closed position.
- B. Fail-Safe Design: Unit shall not require electricity or battery backup systems when activated to the self-opening emergency condition.

2.3 OVERHEAD-COILING GRILLE (083326.A01)

- A. Open-Curtain Grille: Overhead coiling grille with a curtain having a network of horizontal rods that interconnect with vertical links.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by Mckee Door Company or a comparable product from one of the following:
 - a. Cornell Cookson
 - b. Clopay Building Products.
- B. Basis of Design Products: Subject to compliance with requirements, provide SG3000-SL9-HC-PC Door or a comparable product from one of the other manufacturers listed.
- C. Operation Cycles: Grille components and operators capable of operating for not less than 10,000. One operation cycle is complete when a grille is opened from the closed position to the fully open position and returned to the closed position.
 - 1. Include tamperproof cycle counter.
- D. Grille Curtain Material:
 - 1. Curtain: Shall be the SL9 pattern consisting of 5/16 inch diameter solid aluminum rods and vertical links fabricated of 1/16 inch thick aluminum strips which are set in a straight lattice pattern. The vertical spacing is 9 inch while the horizontal spacing is set at 2 inch.
 - 2. Fabricate interlocking slat sections with high strength molded nylon endlocks riveted to ends of alternate slats.

3. Slat Finish: Manufacturer's standard powder-coat finish.
- E. Bottom Bar: Shall be fabricated of an extruded tubular section of not less than 1-1/2 inch x 3 inch aluminum formed to fit curtain.
 1. Bottom Bar Finish: Match grille curtain.
 - F. Curtain Jamb Guides: Each guide assembly shall be fabricated of a minimum 3 inch x 3 inch steel support angle or steel support tube, with a 2-1/2 inch minimum extruded aluminum guide finished to match grille curtain. Guides shall be furnished with integral nylon wear strips to prevent metal to metal contact..
 - G. Mounting Brackets: Fabricated of hot rolled 3/16 inch steel plate minimum, brackets shall be provided to house ends of the counterbalance barrel assembly. Finish to match curtain material.
 - H. Hood: Hood shall be provided to entirely enclose curtain and counterbalance barrel assembly. Hood shall be fabricated 22 gauge G90 galvanized steel and designed to match brackets. Top and bottom shall be bent and reinforced for stiffness.
 1. Finish: Match curtain material and finish.
 2. Mounting: As indicated on Drawings.
 - I. Counterbalance Assembly: Coiling security grille shall be counterbalanced by means of adjustable steel helical torsion springs attached to shaft enclosed in pipe with required mounting blocks or rings for attachment of curtain. Grease sealed bearings or self-lubricating graphite bearings shall be attached to the spring barrel which shall be fabricated of hot formed structural quality carbon steel seamless pipe.
 - J. Hand Chain Operator: Coiling security grille shall be provided with a gear reduction mechanism designed and built by the door manufacturer. The gear reduction mechanism shall not require more than 35 pounds of operational force to move the coiling security grille in either direction.
 - K. Finish: After completion of fabrication, clean all metal surfaces to remove dirt and chemically treat to provide for powder coat adhesion. Provide powder coat finish of color as selected by architect from manufacturer's standard RAL powder coat selection chart.

2.4 GRILLE CURTAIN MATERIALS AND CONSTRUCTION

- A. Open-Curtain Grilles: Fabricate metal grille curtain as an open network of horizontal rods, spaced at regular intervals, that are interconnected with vertical links, which are formed and spaced as indicated and are free to rotate on the rods.
 1. Aluminum Grille Curtain: ASTM B 221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- B. Endlocks: Continuous end links, chains, or other devices at ends of rods; locking and retaining grille curtain in guides against excessive pressures, maintaining grille curtain alignment, and preventing lateral movement.
- C. Bottom Bar: Manufacturer's standard continuous channel or tubular shape, finished to match grille.
 1. Astragal: Equip each grille bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.
- D. Grille Curtain Jamb Guides: Manufacturer's standard extruded aluminum shapes having curtain groove with return lips or bars to retain curtain. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise; with removable stops on guides to prevent overtravel of curtain.

2.5 COUNTERBALANCING MECHANISM

- A. General: Counterbalance grilles by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of parts and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.

- C. Spring Balance: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.
- D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
- E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

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. Anodized Finish: Manufacturer's standard clear anodized finish.

2.8 STEEL AND GALVANIZED-STEEL FINISHES

- A. Factory Prime Finish: Manufacturer's standard primer, compatible with field-applied finish. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
- B. Examine locations of electrical connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install overhead coiling grilles and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Install overhead coiling grilles, hoods, and operators at the mounting locations indicated for each grille.
- C. Accessibility: Install overhead coiling grilles, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.
- D. Power-Operated Grilles: Install according to UL 325.

3.3 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Perform installation and startup checks according to manufacturer's written instructions.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly so that grilles operate easily, free of warp, twist, or distortion.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.

3.5 DEMONSTRATION

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

END OF SECTION 083326 083326

This page intentionally left blank

SECTION 084113 - ALUMINUM FRAMED ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Thermal Broken Storefront Framing (4.5") (084113.A01).
2. Thermal Broken Storefront Framing (6") (084113.A02).
3. Non-Thermal Broken Storefront Framing (4.5") (084113.A06).
4. Aluminum Door (Heavy Duty) (084113.A12).
5. FRP Door (084113.A14).
6. Aluminum Sliding Door (084113.A16).
7. Aluminum Subsills (084113.A21).
8. Aluminum Closure Flashing (084113.A22).
9. Aluminum Pan Flashing (084113.A23).
10. Concealed Flashing (084113.A24).
11. Jamb Closure Membrane (084113.A25).
12. Aluminum Receptor (084113.A26).
13. Mullion Extension (084113.A33).

B. Related Requirements:

1. Section 012300 "Alternates" for alternates effecting work of this Section.
2. Section 079200 "Joint Sealants" for installation of joint sealants installed in storefronts and entrance framing and for sealants not specified in this Section.
3. Section 087100 "Door Hardware" for door hardware for aluminum doors.
4. Section 088000 "Glazing" for glass within storefront and entrance systems.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference:** Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, installation instructions, material descriptions, dimensions of individual components and profiles, hardware, accessories and finishes.

B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.

1. Elevations shall be drawn at ½ inch scale.
2. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
3. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
 - a. Joinery, including concealed welds.
 - b. Anchorage.
 - c. Interface with adjoining building construction.
 - d. Expansion provisions.
 - e. Glazing.
 - f. Flashing and drainage.
4. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
5. Shop Drawings shall be signed and sealed by a structural engineer licensed in the state where the project is located.

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. Architect reserves the right to require additional samples for verification purposes that show fabrication techniques and workmanship.
- E. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch lengths of full-size components and showing details of the following:
1. Joinery, including concealed welds.
 2. Anchorage.
 3. Expansion provisions.
 4. Glazing.
 5. Flashing and drainage.
- F. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.
- G. Delegated-Design Submittal: For aluminum-framed entrances and storefronts indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
1. Detail fabrication and assembly of aluminum-framed systems.
 2. Include design calculations.
 3. Indicate design solutions for deflections of overhead structure as indicated on Structural Drawings.
 4. For aluminum-framed entrances and storefronts indicated to receive laminated (security) glazing systems, indicate design solutions recommended by laminated (security) glazing manufacturer to provide forced entry resistance level indicated in Section 088000 "Glazing".

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and field-testing agency.
- B. Energy Performance Certificates: For aluminum-framed entrances and storefronts, accessories, and components, from manufacturer.
1. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed entrance and storefront.
- C. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by manufacturer and witnessed by a qualified testing agency.
- D. Preconstruction Test Reports: For sealant.
- E. Quality-Control Program: Developed specifically for Project, including fabrication and installation, according to recommendations in ASTM C 1401. Include periodic quality-control reports.
- F. Source quality-control reports.
- G. Field quality-control reports.
- H. Sample Warranties: For special warranties.

1.5 QUALITY ASSURANCE

- A. Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.
- B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- C. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.
- D. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements,

alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.
- E. Listings and Labels for Fire-Rated Framing: Fire rated framing and glazing shall be under current follow-up services by an approved independent agency and maintain a current listing or certification. Assemblies shall be labeled in accordance with limits of listings.
- F. Source Limitations:
1. For Aluminum-Framed Storefront Systems: Obtain from single source from single manufacturer.
 2. For Heavy-Duty Door Systems: Obtain from single source from single manufacturer.
 3. For Aluminum Sliding Door Systems: Obtain from single source from single manufacturer.

1.6 MOCKUPS

- A. Mockups/Field Samples: Build mockups/field samples, to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
1. Mockups/Field Samples: Furnish and install quantity and size of aluminum windows indicated on Drawings within mockup constructed under Section 042000 "Unit Masonry." Mockup/Field Sample will be used set quality standards for materials and execution.
 - a. Install aluminum window to demonstrate surface preparation and installation of: jamb closure membrane, subsill, window framing, and application of perimeter window sealant and associated flashing.
 - b. Window shall include specified glazing where mockup is erected.
 - c. Maintain a 3/8 to 1/2 inch wide gap around entire perimeter of window to receive sealant.
 - d. Coordinate installation of window within mockups to permit inspection by Architect. Approved window installation will set quality standard of installation and aesthetic qualities of workmanship for project.
 2. Mockups/Field Sample of Horizontal Sliding Doors: Furnish and install one horizontal sliding door unit, including closure trim, sealant at frames and leveling compound at threshold. Mockup/Field Sample will be used set quality standards for materials and execution. Architect will select opening location for sliding door mockup/field sample.
 - a. Sliding door unit shall include specified glazing where mockup is erected.
 - b. Maintain a 3/8 to 1/2 inch wide gap around entire perimeter of sliding door unit to receive sealant. Where gap exceeds 1/2 inch, provide aluminum closure trim.
 - c. Coordinate installation of sliding door unit mockup to permit inspection by Architect. Approved installation will set quality standard of installation and aesthetic qualities of workmanship for project.
 3. Field Samples: Build field sample/mockup of typical wall areas as shown on Drawings.
 - a. Note: Mockup shall be a field sample of storefront, entrance and punched opening areas in Project. Architect and manufacturer's representative will observe installation of first 100 square feet of storefront installation and 100 square feet of entrance framing installation.
 4. Field testing shall be performed on field sample areas according to requirements in "Field Quality Control" Article.
 5. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 6. Subject to compliance with requirements, approved mockups/field sample areas may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver aluminum framing components in manufacturer's original protective packaging.
- B. Store aluminum components in a clean dry location away from uncured masonry and concrete. Cover components with waterproof paper, tarpaulin or polyethylene sheeting in a manner to permit circulation of air.
1. Stack framing components in a manner that will prevent bending and avoid damage.

1.8 PROJECT CONDITIONS

- A. Field Measurements: Check openings by accurate field measurements before fabrication. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay in the work.
- B. Commencement of aluminum entrance and storefront work will be construed as Installer's acceptance of substrate surfaces and rough openings indicated to receive work of this Section.

1.9 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration created by wind and thermal and structural movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Water penetration through fixed glazing and framing areas.
 - e. Failure of operating components.
 - 2. Warranty Period: Two years from date of Substantial Completion.
 - 3. Warranty period for heavy-duty doors and associated frames shall be ten (10) years from date of Substantial Completion.
- B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Deterioration 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: 10 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design aluminum-framed entrances and storefronts.
- B. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 - 1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 - 2. Failure also includes the following:
 - a. Thermal stresses transferring to building structure.
 - b. Glass breakage.
 - c. Noise or vibration created by wind and thermal and structural movements.
 - d. Loosening or weakening of fasteners, attachments, and other components.
 - e. Failure of operating units.
- C. Structural Loads:
 - 1. Wind Loads: As indicated on Drawings.
 - 2. Other Design Loads: As indicated on Drawings.
- D. Deflection of Framing Members: At design wind pressure, as follows:

1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
 2. Deflection Parallel to Glazing Plane: Limited to 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 inch.
 - a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.
 - b. Refer to Structural Drawings for additional information regard structure and deflection criteria.
 3. Cantilever Deflection: Where framing members overhang an anchor point, as follows:
 - a. Perpendicular to Plane of Wall: No greater than 1/240 of clear span plus 1/4 inch for spans greater than 11 feet 8-1/4 inches or 1/175 times span, for spans less than 11 feet 8-1/4 inches.
- E. Structural: 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, or 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.
- F. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
1. Fixed Framing and Glass Area:
 - a. Maximum air leakage of 0.04 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft.
 2. Entrance Doors:
 - a. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.
 - b. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft.
- G. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:
1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 10.0 lbf/sq. ft. for entrance/storefront framing.
 2. Maximum Water Leakage: No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.
- H. Heavy Duty Aluminum Storefront Doors and Frames:
1. Swing Door Cycle Test: Test doors and frames according to ANSI A250.4 as follows:
 - a. Minimum 16,000,000 cycles.
 2. Cycle Slam Test Method: Test according to NWWDA T.M. 7-90 as follows:
 - a. Minimum 1,000,000 cycles.
- I. Interstory Drift: Accommodate design displacement of adjacent stories indicated.
1. Design Displacement: As indicated on Drawings.
 2. Test Performance: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.4 at design displacement and 1.5 times the design displacement.
- J. Seismic Performance: Aluminum-framed entrances and storefronts shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
1. Seismic Drift Causing Glass Fallout: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.6 at design displacement and 1.5 times the design displacement.
 2. Vertical Interstory Movement: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.7 at design displacement and 1.5 times the design displacement.
- K. Energy Performance: Certify and label energy performance according to NFRC as follows:
1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.40 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
 2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.40 as determined according to NFRC 200.
 3. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 45 as determined according to NFRC 500.

- L. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
 - 2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
 - a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
 - b. Low Exterior Ambient-Air Temperature: 0 deg F.
 - c. Interior Ambient-Air Temperature: 75 deg F.
- M. Structural Sealant: Capable of withstanding tensile and shear stresses imposed by structural-sealant-glazed storefront system without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure.
 - 1. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.
 - 2. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate because sealant-to-substrate bond strength exceeds sealant's internal strength.

2.2 MANUFACTURERS AND PRODUCTS

- A. Basis-of-Design Criteria: Drawings indicate sizes, profiles, and dimensional requirements for storefront, entrance and window framing systems required, that are based on specific types, models and performance criteria indicated. Systems from other manufacturers may be considered, provided deviations in dimensions, profiles and performance are minor and do not change the design concept as judged by the Architect. Burden of proof is on the proposer.
- B. Basis-of-Design Products for Storefront Framing Systems: Subject to compliance with requirements, provide or one of the systems listed below or comparable product submitted to and accepted by Architect prior to bidding.
 - 1. Thermally Broken Storefront and Entrance Framing (084113.A01 – Center Plane Glazed):
 - a. Basis of Design: Kawneer North America; Trifab VG 451T.
 - b. EFCO Corporation; S 403.
 - c. Manko Windows and Doors; 2450 Series.
 - d. Tubelite; 14000.
 - 2. Thermally Broken Storefront and Entrance Framing (084113.A02 – Center Plane Glazed):
 - a. Basis-of-Design: Kawneer North America; Trifab VG 601T.
 - b. EFCO Corporation; Series 406.
 - c. Manko; Series 2650.
 - d. Tubelite; T24650 Series.
 - 3. Non-thermal Storefront and Entrance Framing (084113.A06 — Center Plane Glazed):
 - a. Basis-of-Design: Kawneer North America; Trifab VG 451.
 - b. EFCO Corporation; Series 402 NT.
 - c. Manko Windows and Doors; 450 Series.
 - d. Tubelite; 14000 Series (non-thermal).
 - 4. Heavy-Duty (Stile and Rail Construction) Manual-Swing Doors and Associated Frames (084113.A12 - **E10**):
 - a. Basis-of-Design: Special-Lite, Inc. No substitutions allowed.
 - 1) Exterior heavy-duty manual-swing entrance doors: Model "SL-15" (wide stile).
 - 2) Interior heavy-duty manual-swing vestibule doors: Model "SL-15" (wide stile).
 - 5. Interior horizontal sliding doors (084113.A16 - **G1**):
 - a. Basis-of-Design: Kawneer North America; Model 1010 Sliding Mall Front.
 - b. Comparable products may be acceptable, when submitted to and accepted by Architect prior to bidding.
 - c. Interlocking Hardware: Manufacturer and Installer shall provide recommended hardware for a sequentially opening and sequentially closing operation of mall front panels. Independent sliding panels will not be acceptable.
 - 1) All hardware required for sequentially opening and sequentially closing operation shall be included under the base bid.
 - 2) Possible hardware shall include but not be limited to cushion shoe support brackets to assure there are not door pinch points between panels.
 - d. Door Pull: Aluminum tube pull.
 - e. Locking Devices: Refer to Section 087100 "Door Hardware" for lock requirements.
 - f. Glazing: Refer to Section 088000 "Glazing" for glazing requirements.

- C. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing and accessories, from single manufacturer.

2.3 FRAMING

- A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
 - 1. Construction:
 - a. Thermally broken
 - b. Non-Thermal
 - 2. Glazing System:
 - a. Retained mechanically with gaskets on four sides.
 - 3. Glazing Plane:
 - a. Exterior Locations:
 - 1) Center plane glazed.
 - b. Interior Locations:
 - 1) Center plane glazed.
 - 4. Finish: Refer to Exterior Finish Legend on Drawings for locations.
 - a. Clear anodized finish.
 - 5. Fabrication Method: Field-fabricated stick system.
- B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
- C. Pressure Caps: Manufacturer's standard snap-on aluminum caps that mechanically retain glazing.
 - 1. Provide extended caps where indicated.
 - 2. At 90 degree outside corners, provide pre-manufactured mullion cap/trim as single unit to cover both sides where shown.
- D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- E. Materials:
 - 1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - a. Sheet and Plate: ASTM B 209.
 - b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
 - c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
 - d. Structural Profiles: ASTM B 308/B 308M.
 - 2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.
 - a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
 - b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
 - c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.4 ENTRANCE DOOR SYSTEMS

- A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
 - 1. General:
 - a. Thermal Construction: Manufacturer's standard elastomeric type.
 - b. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.
 - 1) Provide nonremovable glazing stops on outside of door.
 - 2. Heavy Duty - Stile and Rail Door Construction (084113.A12): 1-3/4-inch overall thickness, with minimum 0.125-inch-thick, extruded-aluminum tubular rail and stile members. Corners shall be mortised and tenon construction, reinforced with 3/8-inch diameter galvanized steel concealed tie rods. Glass stops shall be integral with stile and rail extrusions on one side
 - a. Exterior heavy-duty manual-swing entrance doors (Type #): Doors shall have 4-3/4-inch-wide stiles, 6-1/2-inch top rail, 12-inch intermediate rail and 10 inch bottom rail.

- b. Interior heavy-duty manual-swing vestibule doors (Type #): Doors shall have 4-3/4-inch-wide stiles, 6-1/2-inch top rail, 12-inch intermediate rail and 10 inch bottom rail.
 - 3. Interior horizontal sliding doors (084113.A16): Doors shall be as indicated. Tracks shall be low-profile type to suit stacking indicated. Track shall be surface-mounted unless indicated otherwise.
- B. Entrance Door Framing and Subframing:
 - 1. Door Framing (Heavy Duty Doors):
 - a. For 4-1/2 inch framing – Basis of Design: Special-Lite, Inc.; “SL-245FG”, compatible with storefront framing system.
 - b. At the request of the Owner, substitutions for this product are not allowed.
 - 2. Door Subframing: Manufacturer’s standard, not greater than 1-inch face dimension for use at entrances within curtain wall. Finish to match adjacent curtain wall framing.

2.5 ENTRANCE DOOR HARDWARE

- A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "Door Hardware."
 - 1. Hardware for heavy-duty aluminum doors shall be installed at the door manufacturer’s factory and be included in the warranty.
- B. General: Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule, Section 087100 “Door Hardware”, and as specified hereinafter.
 - 1. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
 - 2. Opening Force Requirements:
 - a. Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbf to set the door in motion and not more than 15 lbf to open the door to its minimum required width.
 - b. Accessible Interior Doors: Not more than 5 lbf to fully open door.
- C. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of entrance door hardware are indicated in "Entrance Door Hardware Sets" Article. Products are identified by using entrance door hardware designations as follows:
 - 1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in "Entrance Door Hardware Sets" Article.
 - 2. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.
- D. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.
- E. Weather Stripping: Manufacturer's standard replaceable components. “Fin” type stops and vinyl weatherstripping are not acceptable.
 - 1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
 - 2. Sliding Type: AAMA 701/702, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.
- F. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.
- G. Silencers: BHMA A156.16, Grade 1.
- H. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch.
- I. Finger Guards: Manufacturer's standard collapsible neoprene or PVC gasket anchored to frame hinge-jamb at center-pivoted doors.

2.6 GLAZING

- A. Glazing: Comply with Section 088000 "Glazing."

- B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
- C. Glazing Sealants: As recommended by manufacturer.
 - 1. Sealant shall have a VOC content of 250 g/L or less.
 - 2. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- D. Weatherseal Sealants: ASTM C 920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with other system components with which it comes in contact; recommended by weatherseal-sealant and glazed storefront manufacturers for this use.
 - 1. Color: As selected by Architect from manufacturer's full range of colors.
 - 2. Color: Match structural sealant.

2.7 ACCESSORIES

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 - 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 - 2. Reinforce members as required to receive fastener threads.
 - 3. Exposed Fasteners: Do not use exposed fasteners except for application of hardware. For application of exposed hardware, use exposed fasteners with countersunk Phillips screw heads or flat-head machine screws, fabricated from 300 series stainless steel.
- B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
 - 1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
- C. Aluminum Subsills (084113.A21): Provide high performance subsill that incorporates a watertight interior back leg with end dams and integral water collection trough that weeps to exterior. Subsill shall be of profile and dimensions required for installation indicated. Finish subsill to match adjacent aluminum framing. Seal all penetrations through subsills to be watertight.
 - 1. Provide high performance subsills at all storefront, entrance and window framing, unless specifically indicated otherwise.
- D. Aluminum Closure Flashing (084113. A22): Provide prefinished aluminum, not less than 0.090 inch thick, of alloy and type selected by manufacturer for compatibility with other components. Fabricate closure flashing to configurations indicated. Finish to match adjacent storefront, entrance and window framing. Seal closure flashing to be watertight.
- E. Aluminum Pan Flashing (084113.A23): Provide prefinished aluminum, not less than 0.090 inch thick, of alloy and type selected by manufacturer for compatibility with other components. Fabricate pan flashing to configurations indicated to direct water to exterior away from storefront and window framing. Finish to match adjacent storefront and window framing.
- F. Aluminum Jamb Extensions: prefinished aluminum of finish, size, profile and material to match framing system. Anchor to framing member. Extension depth as indicated on drawings.
 - 1. Size: As indicated on Drawings.
- G. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
- H. Jamb Closure Membrane (084113.A25):
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide one of the following products:
 - a. "CCW-705-TWF"; as manufactured by Carlisle Coatings and Waterproofing.
 - b. "Perm-A-Barrier Wall Flashing"; as manufactured by Grace Construction Products.
 - c. "Air-Shield"; as manufactured by W. R. Meadows, Inc.
 - d. "Blueskin"; as manufactured by Henry Corp.

2. Product Characteristics:
 - a. Self-adhering, membrane, 40 mils thick.
 - b. Flashing shall function as an air, vapor and water barrier.
 - c. Flashing shall be compatible with air barrier coating specified in Section 072729.
- I. Aluminum Receptor (084113.A26): Provide manufacturer's high performance head compensating receptor as required. Provide prefinished aluminum, of alloy and type selected by manufacturer for compatibility with other components. Finish to match adjacent storefront, entrance and window framing. Seal all penetrations through head to be watertight.
 1. Provide high performance head compensating receptor as indicated on the drawings.
- J. Aluminum Snap Trim (Mullion Extensions)(084113.A33): Provide prefinished aluminum trim, in manufacturer's standard thickness, of alloy and type selected by manufacturer for compatibility with other components. Snap trim shall be two-piece trim, including continuous trim clip and continuous trim cover. Finish for trim clip shall be mill finish. Finish for trim cover to match adjacent storefront and window framing.
 1. Size: 1 by 1-1/4 inches.
 2. Size: As indicated on Drawings.
- K. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

2.8 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. 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 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. Provisions for field replacement of glazing from interior.
 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- E. Storefront Framing: Fabricate components for assembly using shear-block system, or screw-spline system, or head-and-sill-receptor system with shear blocks at intermediate horizontal members.
- F. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
 1. At exterior door frames, provide compression weather stripping at fixed stops.
 2. At interior door frames, 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.
 3. Fin-type door stops are not acceptable.
- G. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
 1. Heavy Duty – Stile and Rail Construction (084113.A12): Aluminum standard doors shall be fabricated as previously specified.
 2. Reinforce doors as required for installing entrance door hardware.
 3. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
 4. At exterior doors, provide weather sweeps applied to door bottoms.
- H. 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.

2.9 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

2.10 SOURCE QUALITY CONTROL

- A. Structural Sealant: Perform quality-control procedures complying with ASTM C 1401 recommendations including, but not limited to, assembly material qualification procedures, sealant testing, and assembly fabrication reviews and checks.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare surfaces that are in contact with sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

3.3 INSTALLATION

- A. General:
 - 1. Comply with manufacturer's written instructions.
 - 2. Do not install damaged components.
 - 3. Fit joints to produce hairline joints free of burrs and distortion.
 - 4. Rigidly secure non-movement joints.
 - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
 - 6. Seal perimeter and other joints watertight unless otherwise indicated.
 - 7. Completely fill gaps between shims and adjacent construction with loose fiberglass insulation or spray foam insulation.
 - 8. At fire-rated openings, install frames according to NFPA 80.
 - 9. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
 - 10. Smoke-Control Doors: Install doors and gaskets according to NFPA 105.
- B. Metal Protection:
 - 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
 - 2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Set continuous sill members and flashing in full sealant bed as specified in Section 079200 "Joint Sealants" to produce weathertight installation.
- D. Install components plumb and true in alignment with established lines and grades.
 - 1. Install two-piece snap trim with long leg oriented horizontally and short leg fastened to aluminum framing, so that trim cover is exposed, and trim clip is concealed. Secure trim to aluminum framing and adjacent construction in accordance with trim manufacturer's written instructions.

- E. Prior to installation of perimeter vertical members, install jamb closure membrane at cavity walls to cover gap/joint between interior and exterior substrates. Intent is to seal air cavity and joints between substrates. Extend membrane from interior face of framing/blocking to exterior. Trim membrane so that it will not be exposed to view after vertical members are set, and edge of membrane is terminated in sealant installed around perimeter of aluminum framing.
 - 1. Seal tops of end dams at jambs to adjacent construction or extend jamb closure membrane over end dam to direct water into subsill in order to drain to exterior.
- F. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.
- G. Install glazing as specified in Section 088000 "Glazing."
- H. Install weatherseal sealant according to Section 079200 "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.
- I. 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.

3.4 ERECTION TOLERANCES

- A. Erection Tolerances: Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:
 - 1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
 - 2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
 - 3. Alignment:
 - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
 - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
 - 4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Field Quality-Control Testing: Perform the following test on representative areas of aluminum-framed entrances and storefronts.
 - 1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
 - a. Perform tests in each test area as directed by Architect.
 - 1) For punched openings, test 25 percent of installation, in each type of exterior finish substrate, unless noted otherwise.
 - 2) For storefront, and clerestories; test each installation, unless noted otherwise.
- C. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION 084113

SECTION 084123 - STEEL FRAMED ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Non-Thermal Steel Storefront Framing (084123.A01).
 - 2. Thermal Steel Storefront Framing (084123.A02).
 - 3. Steel door (084123.A10).
- B. Related Requirements:
 - 1. Section 012300 "Alternates" for alternates effecting work of this Section.
 - 2. Section 079200 "Joint Sealants" for installation of joint sealants installed in storefronts and entrance framing and for sealants not specified in this Section.
 - 3. Section 081113 "Hollow Metal Doors and Frames."
 - 4. Section 084113 "Aluminum Framed Entrances and Storefronts."
 - 5. Section 085123 "Steel Windows."
 - 6. Section 087100 "Door Hardware" for door hardware for steel doors.
 - 7. Section 088000 "Glazing" for glass within storefront and entrance systems.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, installation instructions, material descriptions, dimensions of individual components and profiles, hardware, accessories and finishes.
- B. Shop Drawings: For steel entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.
 - 1. Elevations shall be drawn at ½ inch scale.
 - 2. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
 - 3. Include full-size isometric details of each vertical-to-horizontal intersection of steel-framed entrances and storefronts, showing the following:
 - a. Joinery, including concealed welds.
 - b. Anchorage.
 - c. Interface with adjoining building construction.
 - d. Expansion provisions.
 - e. Glazing.
 - f. Flashing and drainage.
 - 4. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
 - 5. Shop Drawings shall be signed and sealed by a structural engineer licensed in the state where the project is located.
- 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. Architect reserves the right to require additional samples for verification purposes that show fabrication techniques and workmanship.
- E. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch lengths of full-size components and showing details of the following:
 - 1. Joinery, including concealed welds.
 - 2. Anchorage.

3. Expansion provisions.
 4. Glazing.
 5. Flashing and drainage.
- F. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.
- G. Delegated-Design Submittal: For steel-framed entrances and storefronts indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
1. Detail fabrication and assembly of steel-framed systems.
 2. Include design calculations.
 3. Indicate design solutions for deflections of overhead structure as indicated on Structural Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and field-testing agency.
- B. Energy Performance Certificates: For steel-framed entrances and storefronts, accessories, and components, from manufacturer.
1. Basis for Certification: NFRC-certified energy performance values for each steel-framed entrance and storefront.
- C. Product Test Reports: For steel-framed entrances and storefronts, for tests performed by manufacturer and witnessed by a qualified testing agency.
- D. Preconstruction Test Reports: For sealant.
- E. Quality-Control Program: Developed specifically for Project, including fabrication and installation, according to recommendations in ASTM C 1401. Include periodic quality-control reports.
- F. Source quality-control reports.
- G. Field quality-control reports.
- H. Sample Warranties: For special warranties.

1.5 QUALITY ASSURANCE

- A. Manufacturer shall have not less than 10 years experience in the fabrication of custom formed steel doors.
- B. Engineering Responsibility: Prepare data for steel-framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.
- C. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- D. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.
- E. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.
- F. Listings and Labels for Fire-Rated Framing: Fire rated framing and glazing shall be under current follow-up services by an approved independent agency and maintain a current listing or certification. Assemblies shall be labeled in accordance with limits of listings.

G. Source Limitations:

1. For Steel-Framed Storefront Systems: Obtain from single source from single manufacturer.

1.6 MOCKUPS

A. Mockups/Field Samples: Build mockups/field samples, to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Mockups/Field Samples: Furnish and install quantity and size of steel windows indicated on Drawings within mockup constructed under Section 042000 "Unit Masonry." Mockup/Field Sample will be used set quality standards for materials and execution.
 - a. Install steel framed window to demonstrate surface preparation and installation of: jamb closure membrane, subsill, window framing, and application of perimeter window sealant and associated flashing.
 - b. Window shall include specified glazing where mockup is erected.
 - c. Maintain a 3/8 to 1/2 inch wide gap around entire perimeter of window to receive sealant.
 - d. Coordinate installation of window within mockups to permit inspection by Architect. Approved window installation will set quality standard of installation and aesthetic qualities of workmanship for project.
2. Field Samples: Build field sample/mockup of typical wall areas as shown on Drawings.
 - a. Note: Mockup shall be a field sample of storefront, entrance and punched opening areas in Project. Architect and manufacturer's representative will observe installation of first 100 square feet of storefront installation and 100 square feet of entrance framing installation.
3. Field testing shall be performed on field sample areas according to requirements in "Field Quality Control" Article.
4. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
5. Subject to compliance with requirements, approved mockups/field sample areas may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver framing components in manufacturer's original protective packaging.
- B. Store components in a clean dry location away from uncured masonry and concrete. Cover components with waterproof paper, tarpaulin or polyethylene sheeting in a manner to permit circulation of air.
 1. Stack framing components in a manner that will prevent bending and avoid damage.

1.8 PROJECT CONDITIONS

- A. Field Measurements: Check openings by accurate field measurements before fabrication. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay in the work.
- B. Commencement of steel entrance and storefront work will be construed as Installer's acceptance of substrate surfaces and rough openings indicated to receive work of this Section.

1.9 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace components of steel-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration created by wind and thermal and structural movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Water penetration through fixed glazing and framing areas.
 - e. Failure of operating components.
 2. Warranty Period: Five years from date of Substantial Completion.

3. Warranty period for heavy-duty doors and associated frames shall be ten (10) years from date of Substantial Completion.
- B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace steel that shows evidence of deterioration of factory-applied finishes within specified warranty period.
1. Deterioration 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: 10 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design steel-framed entrances and storefronts.
- B. General Performance: Comply with performance requirements specified, as determined by testing of steel-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 2. Failure also includes the following:
 - a. Thermal stresses transferring to building structure.
 - b. Glass breakage.
 - c. Noise or vibration created by wind and thermal and structural movements.
 - d. Loosening or weakening of fasteners, attachments, and other components.
 - e. Failure of operating units.
- C. Structural Loads:
1. Wind Loads: As indicated on Drawings.
 2. Other Design Loads: As indicated on Drawings.
- D. Deflection of Framing Members: At design wind pressure, as follows:
1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
 2. Deflection Parallel to Glazing Plane: Limited to 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 inch.
 - a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.
 - b. Refer to Structural Drawings for additional information regard structure and deflection criteria.
 3. Cantilever Deflection: Where framing members overhang an anchor point, as follows:
 - a. Perpendicular to Plane of Wall: No greater than 1/240 of clear span plus 1/4 inch for spans greater than 11 feet 8-1/4 inches or 1/175 times span, for spans less than 11 feet 8-1/4 inches.
- E. Structural: 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, or 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.
- F. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
1. Fixed Framing and Glass Area:
 - a. Maximum air leakage of 0.04 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft.
 2. Entrance Doors:

- a. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.
 - b. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft.
- G. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:
 - 1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 10.0 lbf/sq. ft. for entrance/storefront framing.
 - 2. Maximum Water Leakage: No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.
- H. Interstory Drift: Accommodate design displacement of adjacent stories indicated.
 - 1. Design Displacement: As indicated on Drawings.
 - 2. Test Performance: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.4 at design displacement and 1.5 times the design displacement.
- I. Seismic Performance: Steel-framed entrances and storefronts shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. Seismic Drift Causing Glass Fallout: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.6 at design displacement and 1.5 times the design displacement.
 - 2. Vertical Interstory Movement: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.7 at design displacement and 1.5 times the design displacement.
- J. Energy Performance: Certify and label energy performance according to NFRC as follows:
 - 1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.40 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
 - 2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.40 as determined according to NFRC 200.
 - 3. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 45 as determined according to NFRC 500.
- K. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
 - 2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
 - a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
 - b. Low Exterior Ambient-Air Temperature: 0 deg F.
 - c. Interior Ambient-Air Temperature: 75 deg F.
- L. Structural Sealant: Capable of withstanding tensile and shear stresses imposed by structural-sealant-glazed storefront system without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure.
 - 1. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.
 - 2. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate because sealant-to-substrate bond strength exceeds sealant's internal strength.

2.2 MANUFACTURERS AND PRODUCTS

- A. Basis-of-Design Criteria: Drawings indicate sizes, profiles, and dimensional requirements for storefront, entrance and window framing systems required, that are based on specific types, models and performance criteria indicated. Systems from other manufacturers may be considered, provided deviations in dimensions, profiles and performance are minor and do not change the design concept as judged by the Architect. Burden of proof is on the proposer.
- B. Basis-of-Design Products for Storefront Framing Systems: Subject to compliance with requirements, provide or one of the systems listed below or comparable product submitted to and accepted by Architect prior to bidding.
 - 1. Steel Storefront and Entrance Framing and Doors (084123.A01 – Center Plane Glazed):
 - a. Basis of Design: Hopes; "5000 Series".

- C. Source Limitations: Obtain all components of steel-framed entrance and storefront system, including framing and accessories, from single manufacturer.

2.3 FRAMING

- A. Framing Members: Manufacturer's extruded- or formed-steel framing members of thickness required and reinforced as required to support imposed loads.
 - 1. Construction:
 - a. 12 gauge galvanized steel frames.
 - 2. Glazing System:
 - a. Retained mechanically with gaskets on four sides.
 - 3. Glazing Plane:
 - a. Exterior Locations:
 - 1) Center plane glazed.
 - 4. Finish: Refer to Drawings for locations.
 - a. Five step finish system; Color to be selected by Architect.
 - 5. Fabrication Method: Field-fabricated stick system.
- B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
- C. Pressure Caps: Manufacturer's standard snap-on steel caps that mechanically retain glazing.
 - 1. Provide extended caps where indicated.
 - 2. At 90 degree outside corners, provide pre-manufactured mullion cap/trim as single unit to cover both sides where shown.
- D. Brackets and Reinforcements: Manufacturer's standard high-strength steel with nonstaining, nonferrous shims for aligning system components.
- E. Materials:
 - 1. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.
 - a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
 - b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
 - c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.4 ENTRANCE DOOR SYSTEMS

- A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
 - 1. General:
 - a. Thermal Construction: Manufacturer's standard elastomeric type.
 - b. Glazing Stops and Gaskets: Square, snap-on, extruded-steel stops and preformed gaskets.
 - 1) Provide nonremovable glazing stops on outside of door.
 - 2. Basis-of-Design Products for Storefront Framing Systems: Subject to compliance with requirements, provide Hopes "5000 Series Swinging Doors" or comparable product submitted to and accepted by Architect prior to bidding.

2.5 ENTRANCE DOOR HARDWARE

- A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "Door Hardware."
 - 1. Hardware for steel doors shall be installed at the door manufacturer's factory and be included in the warranty.
- B. General: Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule, Section 087100 "Door Hardware", and as specified hereinafter.

1. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
2. Opening Force Requirements:
 - a. Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbf to set the door in motion and not more than 15 lbf to open the door to its minimum required width.
 - b. Accessible Interior Doors: Not more than 5 lbf to fully open door.
- C. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of entrance door hardware are indicated in "Entrance Door Hardware Sets" Article. Products are identified by using entrance door hardware designations as follows:
 1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in "Entrance Door Hardware Sets" Article.
 2. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.
- D. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for steel framing.
- E. Weather Stripping: Manufacturer's standard replaceable components. "Fin" type stops and vinyl weatherstripping are not acceptable.
 1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
 2. Sliding Type: AAMA 701/702, made of wool, polypropylene, or nylon woven pile with nylon-fabric or steel-strip backing.
- F. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.
- G. Silencers: BHMA A156.16, Grade 1.
- H. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch.
- I. Finger Guards: Manufacturer's standard collapsible neoprene or PVC gasket anchored to frame hinge-jamb at center-pivoted doors.

2.6 GLAZING

- A. Glazing: Comply with Section 088000 "Glazing."
- B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
 1. Glazing beads shall be extruded steel Alloy 6063-T5 with a minimum thickness of .062 inches.
- C. Glazing Sealants: As recommended by manufacturer.
 1. Sealant shall have a VOC content of 250 g/L or less.
 2. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- D. Weatherseal Sealants: ASTM C 920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with other system components with which it comes in contact; recommended by weatherseal-sealant and glazed storefront manufacturers for this use.
 1. Color: As selected by Architect from manufacturer's full range of colors.
 2. Color: Match structural sealant.

2.7 ACCESSORIES

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 2. Reinforce members as required to receive fastener threads.

3. Exposed Fasteners: Do not use exposed fasteners except for application of hardware. For application of exposed hardware, use exposed fasteners with countersunk Phillips screw heads or flat-head machine screws, fabricated from 300 series stainless steel.
- B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
 1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
- C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
- D. Jamb Closure Membrane:
 1. Basis-of-Design Product: Subject to compliance with requirements, provide one of the following products:
 - a. "CCW-705-TWF"; as manufactured by Carlisle Coatings and Waterproofing.
 - b. "Perm-A-Barrier Wall Flashing"; as manufactured by Grace Construction Products.
 - c. "Air-Shield"; as manufactured by W. R. Meadows, Inc.
 - d. "Blueskin"; as manufactured by Henry Corp.
 2. Product Characteristics:
 - a. Self-adhering, membrane, 40 mils thick.
 - b. Flashing shall function as an air, vapor and water barrier.
 - c. Flashing shall be compatible with air barrier coating specified in Section 072729.
- E. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

2.8 FABRICATION

- A. Door and frames shall be manufactured from 12 gauge steel.
- B. Perimeter frame corners shall be coped and fully welded for maximum strength and weather tightness with face welds dressed smooth.
- C. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- D. Head and jamb door stops shall be an integral portion of the frame with a 5/8" high rebate.
- E. Door leaves shall have inside and outside skins laser cut from single sheet and joined at the door style.
- F. 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. Provisions for field replacement of glazing from interior.
 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- G. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- H. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
 1. At exterior door frames, provide compression weather stripping at fixed stops.
 2. Fin-type door stops are not acceptable.
- I. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
 1. True Divided Lite muntins:
 - a. Muntins shall be manufactured from solid hot-rolled steel, size to be determined by design.
 - b. Glazing rebate surfaces must be perpendicular to the stem of this profile. Rebate surfaces that are tapered will not be acceptable.

- c. 1-3/4" tee shall weigh 1.62 pounds per lineal foot, the 1-3/8" tee shall weigh 1.44 pounds per lineal foot and the 7/8" tee shall weigh 1.19 pounds per lineal foot (specify).
 - d. All steel muntin profiles must be a minimum of 1-3/4" in depth.
- 2. Simulated Divided Lite muntins (select from items below):
 - a. Hot-rolled stainless steel muntin - #84H profile shall be solid hot rolled from stainless steel with tapers rolled integral at the mill. #84H muntins shall be solidly welded to perimeter framing and dressed smooth. Opposite side muntin shall be extruded steel Alloy 6063-T5 matching the profiles as detailed.
 - b. Interior/exterior muntin - Profiles shall be extruded steel Alloy 6063-T5 matching the profiles as detailed.
- J. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
- K. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.9 STEEL FINISHES

- A. Polyurethane finish:
 - 1. Cleaning:
 - a. All hot-rolled steel profiles must be acid pickled as defined by SSPC – SP8 to ensure a pristine, white metal substrate prior to fabrication.
 - 2. Pretreatment:
 - a. Following welding and all machining operations, hot-rolled products and accessories are subjected to the following pretreatments geared specific to projects proximity to corrosive environment. Cold-rolled, formed sheet steel components are manufactured from A60 galvanized sheet and subjected to applicable processes outlined below.
 - b. Inland locations (12-stage process) – Greater than one (1) mile from salt water and/or similar corrosive environments.
 - 1) Alkaline cleaning spray.
 - 2) Alkaline cleaning submersion.
 - 3) Water immersion rinse combo.
 - 4) Water immersion rinse clean.
 - 5) Acid immersion.
 - 6) Neutralizing rinse.
 - 7) Water immersion rinse clean.
 - 8) Conditioner immersion.
 - 9) Zinc phosphate immersion.
 - 10) Rinse immersion.
 - 11) Sealer immersion.
 - 12) Water reverse osmosis rinse immersion.
 - 3. Epoxy E-coat Primer:
 - a. All pickled and pretreated frames and accessories are immersed into an electrostatic (E-coat) bath of PPG epoxy primer to ensure all substrates are encapsulated evenly and completely. Use of spray primers only will not be an acceptable alternative to this process due to benefits from additional cleaning and frame submersion.
 - 1) Permeate spray.
 - 2) Permeate rinse.
 - 3) Epoxy primer immersion and electrostatic encapsulation.
 - 4) Water reverse osmosis rinse.
 - 5) Oven-cure, 45 minutes @ 350° F.
 - 4. Epoxy Powder Primer:
 - a. Following pre-treatments and E-coat system, all frames and accessories shall receive an abrasion resistant powder coating prior to final top-coat.
 - 1) Powder is applied electrostatically over cured E-coat to a dry film thickness (DFT) of 2.0 – 3.0 mils.
 - 2) Parts oven baked at 325° F to completely cure prior to final top coat.
 - 3) Powder coat is intended as an intermediate finish applied prior to the final finish top coat.
 - 5. Acrylic Polyurethane Top Coat.
 - a. Following all pre-treatments, e-coat and powder abrasion layer, all products shall receive Hope's ultrathane polyurethane finish with touch-up capability, low chalking and fading characteristics, unlimited color matching, and 70,000+ standard colors, including metallics.
 - 6. Overview (non-coastal):
 - a. Combined overall dry film thickness (DFT) shall be a minimum of 4.6 mils (inland locations)

- b. Overall process shall provide full documented compliance with the following criteria:
 - 1) Acid Pickling: SSPC-SP8.
 - 2) Paint Blistering: ASTM D714.
 - 3) Humidity: ASTM D4585.
 - 4) Painted Products in Corrosive Environment: ASTM D1654.
 - 5) Salt Spray (Fog): ASTM B117.
 - 6) Cyclic Fog/Dry (Prohesion): ASTM G85.
 - 7) Salt Fog/UV Painted Metal: ASTM D5894.
 - 8) Pull Off Strength of Coating: ASTM D4541.

2.10 SOURCE QUALITY CONTROL

- A. Structural Sealant: Perform quality-control procedures complying with ASTM C 1401 recommendations including, but not limited to, assembly material qualification procedures, sealant testing, and assembly fabrication reviews and checks.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare surfaces that are in contact with sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.
 - 1. Window openings shall conform to details, dimensions and tolerances shown on the window manufacturer's approved shop drawings.
 - 2. Conditions which may adversely affect the window installation must be corrected before installation commences.
 - 3. The wash down of the adjacent masonry or surrounding substrate must be completed before erection commences to prevent damage to the finish by the cleaning materials.

3.3 INSTALLATION

- A. General:
 - 1. Comply with manufacturer's written instructions.
 - 2. Do not install damaged components.
 - 3. Fit joints to produce hairline joints free of burrs and distortion.
 - 4. Rigidly secure non-movement joints.
 - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
 - 6. Seal perimeter and other joints watertight unless otherwise indicated.
 - 7. Completely fill gaps between shims and adjacent construction with loose fiberglass insulation or spray foam insulation.
- B. Metal Protection:
 - 1. Where steel is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
 - 2. Where steel is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Set continuous sill members and flashing in full sealant bed as specified in Section 079200 "Joint Sealants" to produce weathertight installation.

- D. Install components plumb and true in alignment with established lines and grades.
- E. Prior to installation of perimeter vertical members, install jamb closure membrane at cavity walls to cover gap/joint between interior and exterior substrates. Intent is to seal air cavity and joints between substrates. Extend membrane from interior face of framing/blocking to exterior. Trim membrane so that it will not be exposed to view after vertical members are set, and edge of membrane is terminated in sealant installed around perimeter of steel framing.
 - 1. Seal tops of end dams at jambs to adjacent construction or extend jamb closure membrane over end dam to direct water into subsill in order to drain to exterior.
- F. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.
- G. Install glazing as specified in Section 088000 "Glazing."
- H. Install weatherseal sealant according to Section 079200 "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.
- I. 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.
- J. Windows: Install to produce weathertight enclosure and tight fit at weather stripping.
 - 1. Install windows in openings in strict accordance with approved shop drawings.
 - 2. Set units plumb, level and true to line, without warp or rack of frames.
 - 3. Anchor units securely to surrounding construction with approved fasteners.
 - 4. The exterior joints between the windows, trim and mullions shall be properly sealed watertight with an approved sealant and neatly pointed.
 - 5. Attach loose muntin grids per approved shop drawings, if applicable.
 - 6. Repair any abraded areas of the factory finish.

3.4 ERECTION TOLERANCES

- A. Erection Tolerances: Install steel-framed entrances and storefronts to comply with the following maximum tolerances:
 - 1. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
 - 2. Alignment:
 - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
 - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
 - 3. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Field Quality-Control Testing: Perform the following test on representative areas of steel-framed entrances and storefronts.
 - 1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
 - a. Perform tests in each test area as directed by Architect.
 - 1) For punched openings, test 25 percent of installation, in each type of exterior finish substrate, unless noted otherwise.
 - 2) For storefront, and clerestories; test each installation, unless noted otherwise.

- C. Steel-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION 084123

SECTION 085123 - STEEL WINDOWS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes factory-finished fixed steel windows for exterior locations.
- B. Related Requirements:
 - 1. Section 079200 - "Joint Sealants" for sealing joints between frames and adjacent construction.
 - 2. Section 088000 "Glazing" for aluminum window glass.

1.2 REFERENCE STANDARDS

- A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for Windows, Doors, and Skylights 2022.
- B. AAMA 502 - Voluntary Specification for Field Testing of Newly Installed Fenestration Products 2021.
- C. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections 2009.
- D. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.
- E. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- G. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- H. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2023.
- I. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2023.
- J. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements 2009 (Reapproved 2016).
- K. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen 2019.
- L. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference 2014 (Reapproved 2021).
- M. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference 2000 (Reapproved 2023).
- N. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors 2002 (Reapproved 2018).
- O. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference 2015 (Reapproved 2023).
- P. ASTM E1332 - Standard Classification for Rating Outdoor-Indoor Sound Attenuation 2022.
- Q. ASTM E2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights 2023.

- R. ASTM F588 - Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact 2017 (Reapproved 2023).
- S. FS L-S-125 - Screening, Insect, Nonmetallic 1972b, with Notice (1987).
- T. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2022.
- U. NFPA 101 - Life Safety Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- V. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic) 2019.
- W. SWI (INTRO) - Architect's Guide to Steel Windows and Doors Current Edition.
- X. UL 9 - Standard for Fire Tests of Window Assemblies Current Edition, Including All Revisions.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for aluminum windows.
- B. Shop Drawings: For all steel windows.
 - 1. Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.
- C. Samples for Initial Selection: For units with factory-applied finishes.
 - 1. Include Samples of hardware and accessories involving color selection.
- D. Samples for Verification: For steel windows and components required, showing full range of color variations for finishes, and prepared on Samples of size indicated below:
 - 1. Exposed Finishes: 2 by 4 inches.
 - 2. Exposed Hardware: Full-size units.
- E. Product Schedule: For steel windows. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and Installer.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for each type, class, grade, and size of aluminum window. Test results based on use of downsized test units will not be accepted.
- C. Provide services of steel window manufacturer's field representative to observe for proper installation of system and submit report.
- D. Sample Warranties: For manufacturer's warranties.

1.5 QUALITY ASSURANCE

- A. Manufacturer shall have not less than 10 years experience in the fabrication of heavy intermediate steel windows that meet or exceed performance requirements indicated and of documenting this performance by test reports and calculations.. Manufacturer shall be a member of The Steel Window Institute (SWI).
- B. Installer Qualifications: An installer acceptable to steel window manufacturer for installation of units required for this Project and as follows:
 - 1. Installer which has successful experiences with installation of the same or similar units required for this project and other projects of similar size and scope.

- C. Allowable tolerances: Size dimensions + 1/16 inch.
- D. Source quality control:
 - 1. Air infiltration test:
 - a. Products must be independently lab tested in accordance with ASTM E283.
 - b. Air infiltration to meet or exceed 0.30 CFM/ SQFT with differential pressure across window unit of 6.24 PSF.
 - 2. Water penetration test:
 - a. Products must be independently lab tested in accordance with ASTM E331.
 - b. No water penetration for 15 minutes when window is subjected to a rate of flow of 5 gal./hr./sq.ft. with differential pressure across window unit of 6.24 PSF. Pressure determined per job specific design pressure.
 - c. When weeps are required, ASTM E547 cyclic testing standard with differential pressure across window unit of 6.24 PSF shall be standard. Pressure determined per job specific design pressure.
 - 3. Field Testing:
 - a. Field testing criteria (when applicable) shall be in accordance with AAMA 502-12.
 - 4. Structural test:
 - a. Meets or exceeds ASTM E330.
- E. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Build mockup of typical wall area as shown on Drawings.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 PROJECT CONDITIONS

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

1.7 PREINSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site concurrently with preinstallation conference for aluminum entrances and storefronts.
 - 1. Review and discuss the finishing of a steel windows that is required to be coordinated with the finishing of other steel work for color and finish matching.
 - 2. Review, discuss, and coordinate the interrelationship of steel windows with storefront framing and other exterior wall components. Include provisions for anchoring, flashing, weeping, sealing perimeters, and protecting finishes.
 - 3. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
 - 4. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.8 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.
 - 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. Faulty operation of movable sash and hardware.
 - d. Deterioration of materials and finishes beyond normal weathering.
 - e. Failure of insulating glass.
 - 2. Warranty Period: Standard 10 year limited warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Steel Windows: Obtain steel windows from single source from single manufacturer.
- B. Basis-of-Design Product: Subject to compliance with requirements, provide Hope's: " Landmark175 Series with Thermal Evolution Technology," including all perimeter trims, stools, accessories, sealants, shims and anchors.
- C. Comparable products from other manufacturers, meeting specified requirements, will be considered when submitted to and accepted by Architect prior to bidding.

2.2 STEEL WINDOWS

- A. Steel Windows: Hot-rolled steel sections, factory fabricated, factory finished, with vision glass, infill panels, related flashings, anchorage and attachment devices.
 - 1. Grade: Standard Intermediate design based on The Steel Window Institute (SWI).
 - 2. Sash Configuration: Provide fixed non-operable, projected awning in, and projected awning out sash layout.
 - 3. Forced Entry Resistance: Comply with ASTM F588 requirements for performance level of Grade 10 for window Type A in accordance with standard.

2.3 PERFORMANCE REQUIREMENTS

- A. Wind Loads: Design and size components to withstand wind loads without damage or permanent set, when tested in accordance with ASTM E330/E330M, using pressure equal to 1.5 times specified design pressures, with 10 second duration of maximum load.
- B. Design Pressure: In accordance with applicable codes.
- C. Member Deflection: Limit member deflection to 1/200 of the longer dimension; with full recovery of glazing materials.
- D. Air Leakage: 0.06 cfm/sq ft (0.003 L/sec sq m) maximum leakage of window when tested at 1.57 psf (75 Pa) pressure difference in accordance with ASTM E283/E283M.
 - 1. Air infiltration to meet or exceed 0.30 CFM/ SQFT with differential pressure across window unit of 6.24 PSF.
- E. Overall Thermal Transmittance (U-value): 0.35, maximum, including glazing, measured on window sizes required for this project.
- F. Fenestration Assembly Thermal Transmittance (U-value): Comply with ASHRAE Std 90.1 I-P for building envelope requirements for applicable climate zone.
- G. Water Leakage: None, when measured in accordance with ASTM E331 with a test pressure difference of 2.86 lbf/sq ft (136.85 N/sq m).
 - 1. Products must be independently lab tested in accordance with ASTM E331
 - 2. No water penetration for 15 minutes when window is subjected to a rate of flow of 5 gal./hr./sq.ft. with differential pressure across window unit of 6.24 PSF. Pressure determined per job specific design pressure.
 - 3. When weeps are required, ASTM E547 cyclic testing standard with differential pressure across window unit of 6.24 PSF shall be standard. Pressure determined per job specific design pressure.
- H. System Internal Drainage: Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system to the exterior by a weep drainage network.
- I. Acoustic Performance: Minimum outdoor-indoor transmission class (OITC) rating of 34, when tested in accordance with ASTM E90 and ASTM E1332.

- J. Fire-Rated Steel Windows: Comply with UL 9 and labeled with a 3/4 hour or 1 hour fire-test rating as indicated in window schedule, design and fabricate units to meet glass size and configuration, window size and opening dimensions in compliance with NFPA 80, and provide hardware complying with NFPA 80 requirements.
1. Provide operable fire-rated windows that are self-closing and latching by means of heat activated fusible link operator.

2.4 MATERIALS

- A. Heavy intermediate triple weatherstripped windows shall be manufactured from solid hot-rolled steel profiles with thermal isolator.
1. Profiles made from steel with flanges rolled integrally at the mill.
 2. Perimeter frames and ventilator profiles shall have glazing rebates providing an unobstructed glazing surface of at least 5/8".
 3. Glazing rebate surfaces must be perpendicular to the web or stem of the profile. Applied glazing rebate extensions and rebate surfaces that are tapered will not be acceptable.
 4. Combined weight of frame and ventilator composite profiles shall be a minimum of 4.10 pounds per lineal foot. Frame composite profile alone shall not weigh less than 2.10 pounds per lineal foot.
 5. All steel profiles must be a minimum of 1-3/4" in depth.
 6. The solid hot-rolled steel ventilator profile shall have integral groove located at the exterior bedding contact for the reception of weatherstripping.
 7. The isolated composite frame shall provide two additional bedding contacts of weatherstripping to complete triple weatherstripping.
- B. Muntins
1. True Divided Lite Muntins:
 - a. Muntins shall be manufactured from solid hot-rolled steel. Size to be determined by design.
 - b. Glazing rebate surfaces must be perpendicular to the stem of this profile. Rebate surfaces that are tapered will not be acceptable.
 - 1) 1-1/8" tee shall weigh 1.037 pounds per lineal foot.
 - c. All steel muntin profiles must be a minimum of 1-1/4" in depth.
 2. Simulated Divided Lite Muntins
 - a. Hot-rolled stainless steel muntin – #84H profile shall be solid hot-rolled from stainless steel with tapers rolled integral at the mill. #84H muntins shall be solidly welded to perimeter framing and dressed smooth. 10 gauge flat profile muntins shall be solidly welded to perimeter framing and dressed smooth. Opposite side muntin shall be extruded aluminum Alloy 6063-T5 matching the profiles as detailed.
 - b. Interior/exterior muntin - Profiles shall be extruded aluminum Alloy 6063-T5 matching the profiles as detailed.
- C. Thermal isolators shall be composite material.
1. Corners shall be miter cut and gusseted into frame form.
 2. Thermal isolator frames shall be mechanically and structurally bonded to solid hot-rolled steel window frame.
- D. Glazing beads shall be composite or aluminum alloy 6063_T6 profile.
- E. Weatherstripping shall be extruded vinyl, EPDM closed cell sponge, flexible silicone or polyethylene clad urethane foam.
1. All ventilators shall receive continuous triple weatherstripping that shall be applied to the integral weatherstrip grooves in the interior and exterior contact surfaces of the frame and ventilator profiles. Weatherstripping that is surface applied or requires additional retainer or requires screws for application shall not be acceptable.
- F. All screws that are furnished by Hope's for hardware, trim, covers, anchoring, weatherbars, water dams, screens, etc. shall be non-ferrous brass or stainless steel. Glazing bead retainer screws are plated steel.
- G. Finish Process:
1. Cleaning.
 2. Pretreatment.
 3. Epoxy E-Coat primer.
 4. Epoxy powder primer.

5. Ultrathane polyurethane top coat.

2.5 FABRICATION

- A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal, in accordance with approved shop drawings.
- B. Corners of solid hot-rolled steel frame and ventilator profiles shall be mitered or coped then fully welded. Exposed and contact surfaces shall be finished smooth flush with the adjacent surfaces. All interior and exterior rail bar joints shall be face welded and ground smooth. Accurately fit and secure joints and corners. Make joints flush and hairline.
- C. Prepare components to receive anchor devices. Fabricate anchors.
- D. Arrange fasteners to conceal from view.
- E. Prepare components with reinforcement for operating hardware.
- F. Reinforce mullions with internal galvanized steel members to maintain rigidity.
- G. Provide internal drainage weep holes and channels to migrate moisture to exterior. Provide internal drainage of glazing spaces to exterior through weep holes.

2.6 FINISHES

- A. General:
 1. Comply with NAAMM's "Metal Finishes Manual" for recommendations for applying and designating finishes.
 2. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
 3. 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.
- B. Finish with Manufacturer's five part finishing process, Hopes "Power of 5 (non-coastal)":
 1. Cleaning:
 2. Pretreatment:
 3. Epoxy E-coat Primer:
 4. Epoxy Powder Primer:
 5. Acrylic Polyurethane Top Coat.
- C. Colors:
 1. Exterior Surfaces: Color as selected by Architect for manufacturer's full range.
 2. Interior Surfaces: Color as selected by Architect for manufacturer's full range.
- D. Concealed Steel Items:
 1. Galvanized in accordance with requirements of ASTM A123/A123M.
 2. Primed with iron oxide paint.
- E. Apply one coat of bituminous paint to concealed aluminum and steel surfaces in contact with treated wood, cementitious, or dissimilar materials.

PART 3 EXECUTION

3.1 EXAMINATION

- A. 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.
 1. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.

- B. Verify rough opening dimensions, levelness of storefront framing, and operational clearances.
- C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.
- D. The wash down of the adjacent masonry or surrounding substrate must be completed before erection commences to prevent damage to the finish by the cleaning materials.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.
- B. Install fire-rated windows in accordance with NFPA 80 and NFPA 101.
- C. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
- D. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction. Maintain dimensional tolerances and alignment with adjacent work.
- E. Set sill members and sill flashing in continuous bead of sealant.
- F. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- G. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- H. Attach loose muntin grids per approved shop drawings, if applicable.
- I. Install glass and infill panels in accordance with glazing method required to achieve performance criteria; see Section 088000.
- J. Repair any abraded areas of the factory finish.

3.3 TOLERANCES

- A. Maximum Variation from Level or Plumb: 1/16 inches in 3 ft (1.5 mm/m) non-cumulative or 1/8 inches per 10 ft (3 mm/3 m).

3.4 FIELD QUALITY CONTROL

- A. Provide services of steel window manufacturer's field representative to observe for proper installation of system and submit report.
- B. See Section 014000 - Quality Requirements for independent field testing and inspection requirements, and requirements for monitoring quality of specified product installations.
- C. Provide field testing of installed steel windows by independent laboratory in accordance with AAMA 502 and AAMA/WDMA/CSA 101/I.S.2/A440 during construction process and before installation of interior finishes.
 - 1. Perform tests on three individual windows in designated locations as indicated on drawings.
 - 2. Conduct tests on individual windows prior to 5 percent and 50 percent completion of this work.
 - 3. Field test for water penetration in accordance with ASTM E1105 using Procedure B - cyclic static air pressure difference; test pressure shall not be less than 1.9 psf (91 Pa).

4. Field test for air leakage in accordance with ASTM E783 with uniform static air pressure difference of 6.27 psf (300 Pa).
- D. Repair or replace fenestration components that have failed designated field testing, and retest to verify performance complies with specified requirements.

3.5 ADJUSTING, CLEANING, AND PROTECTION

- A. Clean steel surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- B. Clean glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.
 1. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- C. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

END OF SECTION 085123

SECTION 087100 – DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

- A. Intent: The intent of this Section is to provide finish hardware for the proper operation and control of all wood, hollow metal and aluminum doors in the Project. Prior to bidding, notify the Architect of any doors that do not have hardware meeting this intention.
- B. This Section includes items known commercially as finish or door hardware that are required for swinging doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed. This Section includes, but is not necessarily limited to furnishing and installing complete, the following:
 - 1. Finish hardware for proper operation and control of all wood, aluminum and hollow metal doors, including hinges, locks and latch sets, closers, panic devices, auto-flushbolts, electric strikes, magnetic holders, removable mullions, cylinders, keys, miscellaneous stops, flat goods, weatherstripping and thresholds as required.
 - 2. Cylinder for access doors where specified.
- C. Related work in other sections:
 - 1. Hollow metal doors, frames and silencers: Section 081113.
 - 2. Wood doors: Section 081416.
 - 3. Aluminum doors: Section 084113.

1.2 DEFINITIONS

- A. "Finish Hardware" includes items known commercially as finish hardware which are required for swing, and folding doors, except special types of unique and non-matching hardware specified in the same section as the door and door frame.

1.3 ACTION SUBMITTALS

- A. Product Data: Submit manufacturers technical product data for each hardware item. Include information necessary to show compliance with requirements and include instructions for installation and for maintenance of operating parts and finishes.
 - 1. Manufacturer shall submit written certification confirming closers compliance with U.L. 10C.
- B. Hardware Schedule: Submit a hardware schedule in a vertical format (horizontal format not acceptable), organized into sets, including the information below. Designations for door numbers and hardware sets in the schedule shall match those used in the Construction Documents for each opening.
 - 1. Hardware Schedule shall be coordinated with doors, frames, and related work to ensure proper size, thickness, hand function, and finish of door hardware.
 - 2. Catalog cuts of each type of exposed hardware unit, highlighted in color to indicate compliance with the Hardware Schedule.
 - 3. Type, style, function, size and finish of each hardware item.
 - 4. Name and manufacturer of each item.
 - 5. Fastenings and other pertinent information.
 - 6. Explanation of all abbreviations, symbols, codes, etc., contained in schedule.
 - 7. Mounting locations for hardware.
 - 8. Door and frame sizes and materials.
 - 9. Deviations from Specifications shall be noted in cover letter.
- C. Submittal Sequence: Submit schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work (e.g., hollow metal frames) which is critical in the project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by finish hardware, and other information essential to the coordinated review of hardware schedule.
- D. Keying Schedule: Submit separate detailed schedule, at the same time as the Hardware Schedule, indicating keying for all locks and how Owner's instructions, on keying of locks has been fulfilled. Keying schedule must be approved before ordering any locks.

- E. Pinning Transcript: Submit detailed schedule indicating each lock cylinder and core.
- F. Templates: Furnish hardware templates to each fabricator of doors, frames and other work to be factory-prepared for the installation of hardware. Upon request, check shop drawings of such other work, to confirm that adequate provisions are made for proper location and installation of hardware.

1.4 QUALITY ASSURANCE

- A. Manufacturer: Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from a single manufacturer, although several may be indicated as offering products complying with requirements.
- B. Product/Material Qualifications: Manufacturer's product numbers are indicated for convenience in identifying finish hardware items. Unless otherwise indicated, manufacturer's description for indicated product number constitutes minimum standards of quality, design, function and performance required for each item to be incorporated into the Project.
 - 1. It will be the responsibility of the Bidder to furnish with his Bid a list clarifying any deviations from these specifications written or implied, in order that a fair and proper evaluation be made. Those Bidders not submitting a list of deviations will be presumed to have Bid as specified.
- C. Supplier Qualifications: A recognized Architectural Finish Hardware Supplier, with warehousing facilities, who has been furnishing hardware in the project's vicinity for a period of not less than 2 years. Supplier shall be or employ an experienced Architectural Hardware Consultant (AHC) who is certified by and member of the Door and Hardware Institute. The Architectural Hardware Consultant shall be available, at reasonable times during the course of the work, for consultation about project's hardware requirements, to Owner, Architect and Contractor.
 - 1. Supplier shall meet with the Owner to finalize keying requirements and obtain final instructions in writing.
- D. Fire-Rated Openings: Provide hardware for fire-rated openings in compliance with NFPA Pamphlets No. 80, No. 101 and of authorities having jurisdiction requirements. Provide only hardware which has been tested and listed by UL, FM or Warnock Hersey for types and sizes of doors required and complies with requirements of door and door frame labels.
 - 1. Where emergency exit devices are required on fire-rated doors, (with supplementary marking on doors' UL or FM labels indicating "Fire Door to be Equipped with Fire Exit Hardware") provide UL or FM label on exit devices indicating "Fire Exit Hardware".
- E. Standards: Comply with the requirements of the latest edition of the following standards, unless indicated otherwise:
 - 1. American National Standards Institute (ANSI) Publications:
 - 1. A115 Series - Door and Frame Preparation.
 - 2. A156 Series - Hardware.
 - 2. Builders Hardware Manufacturers Association (BHMA) Publications:
 - 1. 1201 - Auxiliary Hardware.
 - 2. 1301 - Materials and Finishes.
 - 3. Door and Hardware Institute (DHI) Publications:
 - 1. Keying - Procedures, Systems, and Nomenclature.
 - 2. Abbreviations and Symbols.
 - 3. Hardware for Labeled Fire Doors.
 - 4. Recommended Locations for Builder's Hardware for Standard and Custom Steel Doors and Frames.
 - 5. Wood Door Standards W1, W2, WDHS-2, WDHS-3.
 - 4. National Fire Protection Association (NFPA) Publications:
 - 1. NFPA Pamphlet No. 80 - Standards for Fire Doors and Windows.
 - 5. International Building Code - current edition adopted.
 - 6. Americans with Disabilities Act (ADA).
- F. Keying Conference: Conduct conference in accordance with Section 013100. In addition to Owner, Construction Manager, and Architect, conference participants shall also include Installer's Architectural Hardware Consultant. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:
 - 1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - 2. Preliminary key system schematic diagram.
 - 3. Requirements for key control system.

4. Address for delivery of keys.

G. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Section 013100 as follows:

1. Architectural Finish Hardware supplier (AFHS) shall conduct the preinstallation conference at the site. The AFHS shall instruct finish hardware installer on proper installation, adjustment and troubleshooting for each operable item of finish hardware specified. The AFHS shall observe the installation and adjustment of the first three locksets, closers and exit devices.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Package each hardware item in separate containers with all screws, wrenches, installation instructions and installation templates. Mark or tag each box with hardware heading and door number according to approved hardware schedule.
- B. Packaging of door hardware is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule. Two or more identical sets may be packed in same container.
- C. Deliver individually packaged hardware items at the proper times to the proper locations (shop or project site) for installation. Provide a complete packing list showing items, door numbers and hardware headings with each shipment.
- D. Store hardware in shipping cartons above ground and under cover to prevent damage.
 1. Provide secure lockup for door hardware delivered to the Project, but not yet installed. Control handling and installation of hardware items that are not immediately replaceable so that completion of the Work will not be delayed by hardware losses both before and after installation.
- E. Aluminum Door Hardware: If required by door manufacturer deliver hardware for aluminum doors as directed by the door supplier for factory installation.

1.6 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- B. Electrical System Roughing-in: Coordinate layout and installation of electrified door hardware with connections to power supplies, fire alarm system and detection devices, access control system, security system, and building control system, as applicable.

1.7 MAINTENANCE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 HARDWARE - GENERAL

- A. Provide the materials or products indicated by trade names, manufacturer's name, or catalog number.
- B. Provide manufacturer's standard products meeting the design intent of this Specifications, free of imperfections affecting appearance or serviceability.
 1. Base Metals: Produce hardware units of basic metal and forming method indicated using manufacturer's standard metal alloy, composition, temper, and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units for finish designations indicated.

2. Provide hardware complete with all fasteners, anchors, instructions, layout templates, and any specialized tools as required for satisfactory installation and adjustment.
 3. Hand of door: Drawings show direction of slide, swing or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.
 4. Furnish screws for installation, with each hardware item. Provide Phillips flat-head screws except as otherwise indicated or approved. Finish screws exposed under any condition to match hardware finish or, if exposed in surfaces of other work, to match finish of such other work as closely as
 5. Finish all other hardware in accordance with the BHMA finish as follows, unless otherwise indicated in manufacturers screws to secure hardware.
 6. Provide concealed fasteners for hardware units which are exposed when door is closed, except to extent 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, except where indicated otherwise or where it is not feasible to adequately reinforce the work. In such cases, provide sleeves for each thru-bolt or use sex bolt fasteners.
 7. Provide factory pinned cylinders and cores.
- C. Hardware is specified in the hardware schedule by set, type, and functions which have been selected as best meeting the application requirements. Acceptable products for each category are specified under PART 2 of this Specification.

2.2 SPECIAL REQUIREMENTS

- A. Hinges:
1. Provide non-removable pins for all exterior doors and out-swinging corridor doors. Use nonrising pins for all other doors.
 2. Pre-drill pilot holes for hinge fasteners at factory to suit hinge type.
 3. Provide continuous hinges where specified.
- B. Locksets:
1. Locksets shall meet or exceed ANSI A156.13-94, Grade 1 requirements.
- C. Panic Devices:
1. All panic devices shall have touchbars made of stainless steel, provide devices in stainless finish where specified.
 2. All latchbolts are to be deadlatching.
 3. Panic devices shall be through-bolted, using sex bolt fasteners.
 4. Exit devices are to incorporate a flush and tapered end cap.
 5. Hardware mullions are to be of the same manufacturer as the panic device. Provide keyed mullions unless otherwise specified. Provide mullion storage kits where specified.
 6. Except on fire-rated doors, or unless specified otherwise, provide panic devices with hex key dogging device to hold latch bolt open on doors with closers.
 7. Devices incorporating plastic dogging components will not be allowed.
 8. Provide electrical options as specified.
- D. Closers:
1. Comply with manufacturer's recommendations for unit size based on door size, weather exposure and usage.
 2. Through-bolt all closer units, using sex bolt fasteners.
 3. Provide parallel arms for all overhead closers, except as otherwise indicated.
 4. All surface closers shall exceed ANSI A156.4 Grade 1 requirements in all aspects as called for below. All closers shall have certification by an independent testing laboratory of 10,000,000 cycles without failure. Provide special rust inhibitive primer (SRI) where specified.
 5. Furnish all brackets, drop plates and any other necessary hardware required to insure proper installation.
- E. Stops
1. Provide heavy duty and concealed or surface mounted overhead stop or holder for interior doors as specified. Provide overhead stop for interior doors that swing more than opens against equipment, casework, sidelights, and where conditions do not allow wall stop.
- F. Thresholds and Gasketing
1. Provide thresholds, weatherstripping (including door sweeps, seals, astragals) and gasketing systems (including smoke, sound, and light) as specified and per architectural details. Match finish of other items.

2. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
3. Gasketing and astragals on aluminum frames by door manufacturer.

G. Silencers

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

2.3 KEYING

- A. Standard Lock Cylinders: BHMA A156.5; Grade 1 cylinders; face finished to match lockset.
- B. Key all locks separately, or alike, as directed by the Owner's representative and Architect. Provide keys as follows:
 1. Change Keys: Two (2) per lock.
 2. Master Keys: Six (6) required (per system).
- C. Existing Key System: Key cylinders to Owners existing master key system.
- D. All exterior doors to be keyed to Schlage Primus, interior doors to match existing keyway.
- E. Provide Schlage cylinders with large format interchangeable construction cores on all exterior openings.

2.4 KEY CONTROL SYSTEM

- A. Fire Department Access Boxes:
 1. Provide key lock boxes designed for storage of 2-5 keys. Manufactured by Knox Company or equal.
 2. Provide one lock box at exterior and provide one near elevators, if applicable.
 3. Locate in accordance with architectural detail. Where not specifically indicated, locate as directed by Architect.
 4. Provide surface mounted or recessed based on direction from Architect.

2.5 HARDWARE FINISHES

- A. Provide matching finishes for hardware units at each door to the greatest extent possible, unless otherwise indicated. In general, match items to the finish for the latch, lock or push-pull unit for color and texture.
 1. Product description or schedule:
 - 1) 626 satin chrome-plated.
 - 2) 630 satin stainless steel.

2.6 HARDWARE PRODUCTS

- A. Hinges:
 1. Specified manufacturer: IVES Hardware; an Allegion Company.
 2. Acceptable substitutions:
 1. Hager Companies.
 2. McKinney Products Company; an ASSA ABLOY Group company.
 3. Stanley Commercial Hardware; Div. of The Stanley Works.
- B. Continuous Gear-Type Hinges:
 1. Specified manufacturer: IVES Hardware; an Allegion Company.
 2. Acceptable substitutions:
 1. Hager Companies.
 2. McKinney Products Company; an ASSA ABLOY Group company.
 3. Select Products Limited.
- C. Locksets:
 1. Specified manufacturer: Schlage Commercial Lock Division; an Allegion Company.
 2. Substitutions: Not allowed. Products to match District standard.
- D. Exit Devices:
 1. Specified manufacturer: Von Duprin; an Allegion Company

2. Substitutions: Not allowed. Products to match District standard.
- E. Closers:
 1. Specified manufacturer: LCN Closers; an Allegion Company.
 2. Substitutions: Not allowed. Products to match District standard.
- F. Flatgoods:
 1. Specified manufacturer: Ives Hardware; an Allegion Company.
 2. Acceptable substitutions:
 1. Burns.
 2. Rockwood.
- G. Stops:
 1. Specified manufacturer: Ives Hardware; an Allegion Company.
 2. Acceptable substitutions:
 1. Burns Manufacturing Incorporated.
 2. Hager Companies.
 3. Rockwood Manufacturing Company.
 4. Trimco
- H. Overhead stops:
 1. Specified manufacturer: Glynn-Johnson; an Allegion Company.
 2. Acceptable substitutions:
 1. Architectural Builders Hardware Mfg., Inc.
 2. Door Controls International.
 3. Ives Hardware; an Allegion Company.
 4. Rixson Specialty Door Controls; an ASSA ABLOY Group.
- I. Thresholds:
 1. Specified manufacturer: Zero International
 2. Acceptable substitutions:
 1. Pemko Manufacturing Co.
 2. Reese Enterprises.
 3. National Guard Products.
- J. Door Gasketing/Weatherstripping:
 1. Specified manufacturer: Zero International
 2. Acceptable substitutions:
 1. Pemko Manufacturing Co.
 2. Reese Enterprises.
 3. National Guard Products.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Carefully inspect doors, frames, and conditions under which hardware will be installed. Notify the Architect of any conditions that would adversely affect the installation or subsequent door operations. Do not proceed until unsatisfactory conditions are corrected.
 1. Frames shall be verified, inspected, and confirmed by General Contractor as being plumb and true.
- B. Refer to Sections 081113, 081416, and 084113 for additional installation requirements.
- C. Prior to hardware installation, the Hardware Supplier shall meet with the Owner's Representative, Architect, and Hardware Installer to ensure the Installer has and understands the manufacturers' installation requirements for all hardware items.
 1. The Supplier shall observe the installation of the first lockset, closer and panic device.

3.2 INSTALLATION

- A. Mount Hardware units at heights indicated in respective DHI Standards, except as specifically indicated or required to comply with governing regulations, and except as may be otherwise directed by Architect.

- B. Install each hardware item in compliance with the manufacturer's instructions and written recommendations. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be field finished, coordinate removal, storage and reinstallation or application of surface protections with finishing work. Do not install surface-mounted items until finishes have been completed on the substrate.
- C. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
 - 1. Special care shall be taken to avoid damaging surrounding surfaces.
- D. Provide fasteners and anchoring devices of suitable size, quantity, and type to secure hardware in proper position for heavy use and long life.
 - 1. Drill and countersink units which are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- E. Adjust door closers immediately upon installation. Adjust in exact conformance with manufacturer's printed instructions. Advance backcheck to eliminate shock at dead stop. Set latching speed to assure unassisted positive latching.
 - 1. Degrees of swing of doors for self-limiting closers shall be maximum available.
- F. Install each protection plate with a thinly-spread spot of mastic at its center to assure even contact before fastening with screws. Install all such plates on visual centers of closed doors. Set bottom edges of all such plates flush with door bottom.
- G. Cut and fit thresholds to door frame profiles. Prepare thresholds for the attachment of strikes and clearance for spindles as required. Set thresholds in a continuously laid bed of polyisobutylene mastic sealant to completely fill voids and exclude moisture from every source.
- H. Seal weather protection components attached to the exterior sides of doors and frames, such as drip caps and weatherstripping, in place with clear silicone caulk in such a manner as to ensure a continuously filled seam throughout the joinery.
- I. Cut and fit weatherstripping accurately to provide the greatest possible continuity of the contact element. Adjust closer templating as required.
- J. At exterior doors, obtain satisfactory operation of the installation, then apply a thin layer of clear silicone caulk under hinge leaves, and outside lock trim. Remove excess caulk after torqueing fasteners.

3.3 ADJUST AND CLEAN

- A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.
 - 1. Clean adjacent surfaces soiled by hardware installation.
- B. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work during the week prior to acceptance or occupancy, and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

3.4 INSTRUCTION AND INSPECTION

- A. Instruct Owner's Personnel in proper adjustment and maintenance of hardware and hardware finishes, during the final adjustment of hardware.
- B. After hardware is installed and adjusted, the Supplier shall inspect the job with the Architect and the Contractor to determine if the hardware is functioning properly.
 - 1. Maintain the instruction sheets, layout templates, and any supplementary literature regarding hardware in a readable condition. Transmit all such items to the Owner's Representative, together with all spare parts, specialized tools, other accessories supplied with the hardware, and a copy of the approved hardware schedule at the time of instruction.
- C. Continued Maintenance Service: Approximately six months after the acceptance of hardware in each area, the Installer, accompanied by the representative of the latch and lock manufacturer, shall return to the project and re-adjust every item of hardware to restore proper function of doors and hardware. Consult

with and instruct Owner's personnel in recommended additions to the maintenance procedures. Replace hardware items which have deteriorated or failed due to faulty design, materials or installation of hardware units at no cost to the Owner. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

HARDWARE SETS

HARDWARE SET: 01

DOOR NUMBER:

A414B B100A

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	112XY EPT	628	IVE
2	EA	POWER TRANSFER	EPT10	689	VON
1	EA	REMOVABLE MULLION	KR4954 (MULLION BY FRAME MANUF AT B100A)	689	VON
1	EA	ELEC PANIC HARDWARE	HD-QEL-99-L-DT-06 24 VDC	626	VON
1	EA	ELEC PANIC HARDWARE	HD-QEL-99-L-NL-06 24 VDC	626	VON
1	EA	MULLION STORAGE KIT	MT54	689	VON
1	EA	MORTISE CYLINDER	20-001	626	SCH
1	EA	RIM CYLINDER	20-057	626	SCH
2	EA	SURFACE CLOSER	4040XP SCUSH	689	LCN
2	EA	CUSH SHOE SUPPORT	4040XP-30 SRT	689	LCN
2	EA	BLADE STOP SPACER	4040XP-61 SRT	689	LCN
1	EA	MULLION SEAL	8780NBK PSA (OMIT AT B100A)	BK	ZER
2	EA	DOOR SWEEP	8192AA	AA	ZER
2	EA	DOOR SWEEP	8197AA	AA	ZER
1	EA	THRESHOLD	65A-223	A	ZER
2	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	REQUEST TO EXIT	BY OWNER		
1	EA	POWER SUPPLY	BY OWNER		
1	EA	WEATHERSTRIP	BY DOOR/FRAME MANUF		
1	EA	NOTE	CARD ACCESS BY OTHERS		

OPERATION: DOOR NORMALLY CLOSED AND LOCKED. ACCESS VIA VALID CARD READ. PANICS MAY BE DOGGED (MADE PUSH/PULL) ELECTRONICALLY OR VIA HEX KEY ON DEVICE. ALWAYS FREE EGRESS.

HARDWARE SET: 02

DOOR NUMBER:

B100B

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	112XY EPT	628	IVE
2	EA	POWER TRANSFER	EPT10	689	VON
1	EA	MULLION	BY FRAMING SYSTEM		
1	EA	ELEC PANIC HARDWARE	HD-QEL-99-L-DT-06 24 VDC	626	VON
1	EA	ELEC PANIC HARDWARE	HD-QEL-99-L-NL-06 24 VDC	626	VON
1	EA	MULLION STORAGE KIT	MT54	689	VON
1	EA	RIM CYLINDER	20-057	626	SCH
2	EA	SURFACE CLOSER	4040XP SCUSH	689	LCN
2	EA	CUSH SHOE SUPPORT	4040XP-30 SRT	689	LCN
2	EA	BLADE STOP SPACER	4040XP-61 SRT	689	LCN
2	EA	DOOR SWEEP	8192AA	AA	ZER
2	EA	DOOR SWEEP	8197AA	AA	ZER
1	EA	THRESHOLD	65A-223	A	ZER
2	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	REQUEST TO EXIT	BY OWNER		
1	EA	POWER SUPPLY	BY OWNER		
1	EA	WEATHERSTRIP	BY DOOR/FRAME MANUF		
1	EA	NOTE	CARD ACCESS BY OTHERS		

OPERATION: DOOR NORMALLY CLOSED AND LOCKED. ACCESS VIA VALID CARD READ. PANICS MAY BE DOGGED (MADE PUSH/PULL) ELECTRONICALLY OR VIA HEX KEY ON DEVICE. ALWAYS FREE EGRESS.

HARDWARE SET: 03

DOOR NUMBER:

A414A

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	112XY EPT	628	IVE
2	EA	POWER TRANSFER	EPT10	689	VON
1	EA	REMOVABLE MULLION	4954	689	VON
2	EA	ELEC PANIC HARDWARE	HD-QEL-99-L-DT-06 24 VDC	626	VON
1	EA	MULLION STORAGE KIT	MT54	689	VON
1	EA	PRIMUS MORT. CYL.	20-700	626	SCH
2	EA	OH STOP & HOLDER	90H	630	GLY
2	EA	SURFACE CLOSER	4040XP EDA ST-2731	689	LCN
2	EA	BLADE STOP SPACER	4040XP-61 SRT	689	LCN
1	EA	MULLION SEAL	8780NBK PSA	BK	ZER
2	EA	DOOR SWEEP	8192AA	AA	ZER
2	EA	DOOR SWEEP	8197AA	AA	ZER
1	EA	THRESHOLD	65A-223	A	ZER
2	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	REQUEST TO EXIT	BY OWNER		
1	EA	REQUEST TO EXIT	BY OWNER		
1	EA	POWER SUPPLY	BY OWNER		
1	EA	WEATHERSTRIP	BY DOOR/FRAME MANUF		
1	EA	NOTE	CARD ACCESS BY OTHERS		

OPERATION: DOOR NORMALLY CLOSED AND LOCKED. ACCESS VIA VALID CARD READ. PANICS MAY BE DOGGED (MADE PUSH/PULL) ELECTRONICALLY OR VIA HEX KEY ON DEVICE. ALWAYS FREE EGRESS.

HARDWARE SET: 04

DOOR NUMBER:

A021

A022

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112XY	628	IVE
1	EA	PANIC HARDWARE	99-EO	626	VON
1	EA	SURFACE CLOSER	4040XP SCUSH	689	LCN
1	EA	CUSH SHOE SUPPORT	4040XP-30 SRT	689	LCN
1	EA	BLADE STOP SPACER	4040XP-61 SRT	689	LCN
1	EA	DOOR SWEEP	8192AA	AA	ZER
1	EA	DOOR SWEEP	8197AA	AA	ZER
1	EA	THRESHOLD	65A-223	A	ZER
1	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	WEATHERSTRIP	BY DOOR/FRAME MANUF		

HARDWARE SET: 05

DOOR NUMBER:

B213A B213B B313A B313B

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	REMOVABLE MULLION	KR4954	689	VON
1	EA	PANIC HARDWARE	CDSI-99-L-DT-06	626	VON
1	EA	PANIC HARDWARE	CDSI-99-L-NL-06	626	VON
2	EA	MORTISE CYL TURN	09-904 114 B502-191 XQ11-949	626	SCH
1	EA	MORTISE CYLINDER	20-001	626	SCH
1	EA	RIM CYLINDER	20-057	626	SCH
2	EA	SURFACE CLOSER	4040XP HEDA	689	LCN
2	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	ASTRAGAL SET	8193AA	AA	ZER
1	EA	MULLION SEAL	8780NBK PSA	BK	ZER

HARDWARE SET: 06

DOOR NUMBER:

A414E A414F

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	040XY	628	IVE
2	EA	FIRE EXIT HARDWARE	9927-EO-F-LBR-499F	626	VON
2	EA	SURFACE CLOSER	4040XP EDA	689	LCN
2	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CCV	630	IVE
2	EA	MAGNET	SEM7850 12V/24V/120V	689	LCN
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	ASTRAGAL SET	8193AA	AA	ZER

HARDWARE SET: 07

DOOR NUMBER:

B000A B101A B101B B101D B212A B212C
B312A B312C

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
2	EA	FIRE EXIT HARDWARE	9927-EO-F-LBR-499F	626	VON
2	EA	SURFACE CLOSER	4040XP EDA	689	LCN
2	EA	KICK PLATE	8400 8" X 1" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CCV	630	IVE
2	EA	MAGNET	SEM7850 12V/24V/120V	689	LCN
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	ASTRAGAL SET	8193AA	AA	ZER

HARDWARE SET: 08

DOOR NUMBER:

A512A

A512B

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
2	EA	FIRE EXIT HARDWARE	9927-L-BE-F-LBR-06-499F	626	VON
1	EA	FIRE/LIFE HOLDER	4040SEH SEH AC/DC	689	LCN
1	EA	SURFACE CLOSER	4040XP CUSH	689	LCN
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
2	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CCV	630	IVE
2	EA	MAGNET	SEM7850 12V/24V/120V	689	LCN
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	ASTRAGAL SET	8193AA	AA	ZER

HARDWARE SET: 09

DOOR NUMBER:

B101C

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
2	EA	FIRE EXIT HARDWARE	9927-L-BE-F-LBR-06-499F	626	VON
2	EA	SURFACE CLOSER	4040XP EDA	689	LCN
2	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CCV	630	IVE
2	EA	MAGNET	SEM7850 12V/24V/120V	689	LCN
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	ASTRAGAL SET	8193AA	AA	ZER

HARDWARE SET: 10

DOOR NUMBER:

A403

A404A

A406A

A407

A501A

A501B

A503

A504A

A506A

A507

B304A

B304D

B305

B306A

B306D

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PANIC HARDWARE	CDSI-99-L-NL-06	626	VON
1	EA	MORTISE CYL TURN	09-904 114 B502-191 XQ11-949	626	SCH
1	EA	RIM CYLINDER	20-057	626	SCH
1	EA	SURFACE CLOSER	4040XP HEDA	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER

HARDWARE SET: 11

DOOR NUMBER:

B000B B104

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	FIRE EXIT HARDWARE	99-L-BE-F-06	626	VON
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	MAGNET	SEM7850 12V/24V/120V	689	LCN
1	EA	GASKETING	488SBK PSA	BK	ZER

HARDWARE SET: 12

DOOR NUMBER:

B101M B102

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PANIC HARDWARE	99-L-BE-06	626	VON
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER

HARDWARE SET: 13

DOOR NUMBER:

A513

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CONST LATCHING BOLT	FB51T	630	IVE
1	EA	STOREROOM LOCK	ND80LD RHO	626	SCH
1	EA	K-I-L CYLINDER	23-065	626	SCH
2	EA	ARMOR PLATE	8400 34" X 1" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CCV	630	IVE
2	EA	SILENCER	SR64	GRY	IVE

HARDWARE SET: 14

DOOR NUMBER:

B315 B316 C014

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80LD RHO	626	SCH
1	EA	K-I-L CYLINDER	23-065	626	SCH
2	EA	SURFACE CLOSER	4040XP EDA	689	LCN
2	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
2	EA	SILENCER	SR64	GRY	IVE

HARDWARE SET: 15

DOOR NUMBER:

A511A

B201

B204

B310

C016B

C017B

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80LD RHO	626	SCH
1	EA	K-I-L CYLINDER	23-065	626	SCH
2	EA	SURFACE CLOSER	4040XP HW/PA	689	LCN
2	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
2	EA	SILENCER	SR64	GRY	IVE

HARDWARE SET: 16

DOOR NUMBER:

A401A

A401B

A405A

A405B

A505A

A505B

A514

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112XY	628	IVE
1	EA	CLASSROOM SECURITY	ND75P6D RHO XN12-035	626	SCH
2	EA	K-I-L CYLINDER	23-065	626	SCH
1	EA	SURFACE CLOSER	4040XP HW/PA	689	LCN
1	EA	WALL STOP	WS406/407CCV	630	IVE

HARDWARE SET: 17

DOOR NUMBER:

B101G

B101J

B103

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM SECURITY	ND75P6D RHO XN12-035	626	SCH
2	EA	K-I-L CYLINDER	23-065	626	SCH
1	EA	SURFACE CLOSER	4040XP RW/PA	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER

HARDWARE SET: 18

DOOR NUMBER:

B101K B209

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM SECURITY	ND75P6D RHO XN12-035	626	SCH
2	EA	K-I-L CYLINDER	23-065	626	SCH
1	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	4040XP RW/PA	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER

HARDWARE SET: 19

DOOR NUMBER:

A400	A401C	A401D	A402	A409	A410
A500	A502	A509	A510	B101E	B101F
B202	B203	B205A	B205D	B206	B207A
B207D	B210	B211	B301	B302	B308
B309	C002D				

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM SECURITY	ND75P6D RHO XN12-035	626	SCH
2	EA	K-I-L CYLINDER	23-065	626	SCH
1	EA	SURFACE CLOSER	4040XP HEDA	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE SET: 20

DOOR NUMBER:

B307A B309A

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70LD RHO	626	SCH
1	EA	K-I-L CYLINDER	23-065	626	SCH
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE SET: 21

DOOR NUMBER:

C012

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CLASSROOM LOCK	ND70LD RHO	626	SCH
1	EA	K-I-L CYLINDER	23-065	626	SCH
		NOTE	REMAINDER OF HARDWARE EXISTING		

HARDWARE SET: 22

DOOR NUMBER:

C002A

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CONST LATCHING BOLT	FB51T	630	IVE
1	EA	CLASSROOM SECURITY	ND75P6D RHO XN12-035	626	SCH
1	EA	K-I-L CYLINDER	23-065	626	SCH
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MOUNTING BRACKET	MB	689	IVE
2	EA	SURFACE CLOSER	4040XP HEDA	689	LCN
2	EA	KICK PLATE	8400 8" X 1" LDW B-CS	630	IVE
2	EA	SILENCER	SR64	GRY	IVE

HARDWARE SET: 23

DOOR NUMBER:

A001

C019

C023

C024

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	KEYED PRIVACY W/INDICATOR	L9056L 06A L583-363 L283-722	626	SCH
1	EA	MORTISE CYLINDER	20-001	626	SCH
1	EA	SURFACE CLOSER	4040XP RW/PA (4040XP SCUSH AT C019)	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER

HARDWARE SET: 24

DOOR NUMBER:

B005 B007 C021A

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM DEADBOLT	B663P6	626	SCH
1	EA	K-I-L CYLINDER	23-065	626	SCH
1	EA	PUSH PLATE	8200 6" X 16"	630	IVE
1	EA	PULL PLATE	8303 10" 4" X 16"	630	IVE
2	EA	SURFACE CLOSER	4040XP RW/PA	689	LCN
2	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
2	EA	SILENCER	SR64	GRY	IVE

HARDWARE SET: 25

DOOR NUMBER:

C020 C022

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM DEADBOLT	B663P6	626	SCH
1	EA	K-I-L CYLINDER	23-065	626	SCH
1	EA	PUSH PLATE	8200 6" X 16"	630	IVE
1	EA	PULL PLATE	8303 10" 4" X 16"	630	IVE
1	EA	OH STOP	90S	630	GLY
2	EA	SURFACE CLOSER	4040XP RW/PA	689	LCN
2	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
2	EA	SILENCER	SR64	GRY	IVE

HARDWARE SET: 26

DOOR NUMBER:

A508B

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1			EXISTING DOOR, FRAME AND HARDWARE TO REMAIN		

HARDWARE SET: 27

DOOR NUMBER:

A404B A406B A504B A506B B205B B205C
 B207B B207C B304B B304C B306B B306C
 B307B C002C

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	MORTISE CYLINDER	20-001 (VERIFY TYPE/QUANTITY REQUIRED)	626	SCH
1			HARDWARE BY DOOR / FRAME MANUFACTURER		

HARDWARE SET: 28

DOOR NUMBER:

A511B

B314

C013A

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	EU STOREROOM LOCK	ND80LDEU RHO RX CON 12V/24V DC	626	SCH
1	EA	K-I-L CYLINDER	23-065	626	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH	689	LCN
1	EA	KICK PLATE	8400 8" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	BY OWNER		
1	EA	NOTE	CARD ACCESS BY OTHERS		

OPERATION: DOOR NORMALLY CLOSED AND LOCKED. ENTRY VIA VALID CARD READ. ALWAYS FREE FOR EGRESS.

DOOR/HARDWARE SET INDEX

DOOR #	HwSet #
A001	23
A021	04
A022	04
A400	19
A401A	16
A401B	16
A401C	19
A401D	19
A402	19
A403	10
A404A	10
A404B	27
A405A	16
A405B	16
A406A	10
A406B	27
A407	10
A409	19
A410	19
A414A	03
A414B	01
A414E	06
A414F	06
A500	19
A501A	10
A501B	10
A502	19
A503	10
A504A	10

DOOR #	HwSet #
A504B	27
A505A	16
A505B	16
A506A	10
A506B	27
A507	10
A508B	26
A509	19
A510	19
A511A	15
A511B	28
A512A	08
A512B	08
A513	13
A514	16
B000A	07
B000B	11
B005	24
B007	24
B100A	01
B100B	02
B101A	07
B101B	07
B101C	09
B101D	07
B101E	19
B101F	19
B101G	17
B101J	17

DOOR #	HwSet #
B101K	18
B101M	12
B102	12
B103	17
B104	11
B201	15
B202	19
B203	19
B204	15
B205A	19
B205B	27
B205C	27
B205D	19
B206	19
B207A	19
B207B	27
B207C	27
B207D	19
B209	18
B210	19
B211	19
B212A	07
B212C	07
B213A	05
B213B	05
B301	19
B302	19
B304A	10
B304B	27

DOOR #	HwSet #
B304C	27
B304D	10
B305	10
B306A	10
B306B	27
B306C	27
B306D	10
B307A	20
B307B	27
B308	19
B309	19
B309A	20

DOOR #	HwSet #
B310	15
B312A	07
B312C	07
B313A	05
B313B	05
B314	28
B315	14
B316	14
C002A	22
C002C	27
C002D	19
C012	21

DOOR #	HwSet #
C013A	28
C014	14
C016B	15
C017B	15
C019	23
C020	25
C021A	24
C022	25
C023	23
C024	23

END OF SECTION 087100

SECTION 088000 - GLAZING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - a. Windows.
 - b. Doors.
 - c. Interior borrowed lites.
 - d. Storefront framing.
 - e. Glazed entrances.
 - f. Display case doors and display case shelving.
 - g. Merchandizing wall shelving.
 - 2. Glazing sealants and accessories.
 - 3. Glass types include:
 - a. Fully Tempered Monolithic Float Glass.
 - b. Laminated Glass.
 - c. Insulated Fully Tempered Glass.
 - d. Insulated Laminated Glass.
 - e. Spandrel Glass.
 - f. Fire Glazing.
 - 1) Fire resistive glazing.
 - 2) Fire protective glazing.
 - g. Specialty/Decorative Glass.
 - 1) Decorative Film Overlay.
 - 2) Light Diffusing Glass - Acid Etched.
- B. Related Requirements:
 - 1. Section 012300 "Alternates" for those alternates effecting work of this Section.
 - 2. Section 081113 "Hollow Metal Doors and Frames" for vision light glass in hollow metal frames and doors.
 - 3. Section 084113 "Aluminum Framed Entrances and Storefronts."
 - 4. Section 0851123 "Steel Windows."

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. IBC: International Building Code.
- D. Interspace: Space between lites of an insulating-glass units.

1.3 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.4 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM E 119: Fire Tests of Building Construction and Materials.

- B. American National Standards Institute (ANSI):
 - 1. ANSI Z97.1: Standard for Safety Glazing Materials Used in Buildings.
- C. Consumer Product Safety Commission (CPSC):
 - 1. CPSC 16 CFR 1201: Safety Standard for Architectural Glazing Materials, Category II.

1.5 PREINSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site.
 - 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. Review temporary protection requirements for glazing during and after installation.
 - 3. Review drawings for locations and details of glazing.
 - 4. Review custom ceramic glazing.

1.6 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.

1.7 ACTION SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
 - 1. For security "forced entry resistant" glass, include UL listing verification and UL-752 Test Results.
 - 2. For security "forced entry resistant" glass, include manufacturer's written installation and cleaning instructions.
- B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square. Submit the samples listing glass type corresponding to Glass Legend indicated on Drawings and as follows:
 - 1. Tinted Monolithic Float Glass.
 - 2. Tinted Fully Tempered Monolithic Float Glass.
 - 3. Laminated Glass.
 - 4. Insulated Glass.
 - 5. Insulated Fully Tempered Glass.
 - 6. Insulated Laminated Glass.
 - 7. Spandrel Glass.
 - 8. Fire Glazing:
 - a. Fire-resistive glazing products.
 - b. Fire protective glazing products.
 - 9. Specialty Glass:
 - a. Custom Digital Artwork Ceramic Ink Proofs: Before printing, prepare full-color proofs which include a full-scale sample, as well as a reduced sample of the entire graphic for each artwork location for the Architect's approval. Approved proof will set the quality standards for graphic and aesthetic effect.
 - b. Decorative Film Overlay.
 - 1) Glazing Film Overlay Samples: Submit colored manufacturer's standard sample sets showing full range of colors available for each type and color indicated.
- C. Fire-Rated Window/Wall Framing Samples: For each of the following:

1. Sample of steel frame, not less than 6 inches in length.
 2. Sample of aluminum cover cap, not less than 6 inches in length and in finish specified.
- D. Glazing Accessory Samples: For sealants and spacers, in 12-inch lengths.
- E. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
1. Indicate coordinated dimensions of security glazing and construction that receives security glazing, including clearances and glazing channel dimensions.
- F. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- G. Field Dimensions for Custom Digital Artwork Ceramic Ink Glazing: Provide field dimensions to Architect for graphic design of digital artwork graphics. Include dimensions, locations, and graphic depictions of all disruptions within the field of glazing surface indicated to receive digital artwork. Examples of disruptions of wall surface include, but are not limited to: frames, mullions, etc.
1. Elevations and dimensions shall be drawing using a computer aided drafting program and submitted in a legible format.
 2. Dimensional Tolerance: 1/8 inch maximum.
 3. Dimensions shall be reviewed and accepted by signage manufacturer prior to submittal of shop drawings.

1.8 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For the following:
1. Installers.
 2. Manufacturers of insulated glass units with low-E coatings.
 3. Glass testing agency.
 4. Sealant testing agency.
- B. Product Certificates: For each type of glass and glazing product, from manufacturer. For glass.
- C. Product Test Reports: For glazing sealants, for tests performed by a qualified testing agency.
1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
- D. Preconstruction adhesion and compatibility test report.

1.9 CLOSEOUT SUBMITTALS

- A. Warranties: Sample of special warranties.

1.10 QUALITY ASSURANCE

- A. Manufacturer Qualifications for Insulating-Glass Units with Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.
- B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- C. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
- D. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- E. 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.

- F. 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, and the fire-resistance rating in minutes.
- G. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
- H. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Install glazing in mockups specified in related Sections indicated below to match glazing systems required for Project, including glazing methods.
 - a. Section 084113 "Aluminum-Framed Entrances and Storefronts".
 - b. Section 085123 "Steel Windows."
 - 2. Install security glazing in mockups specified in related Sections indicated below to match glazing systems required for Project, including security glazing methods.
 - a. Section 084113 "Aluminum-Framed Entrances and Storefronts."
 - b. Section 085113 "Steel Windows."
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.11 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. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.12 FIELD 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 are below 40 deg F.
- B. Environmental Limitations for Fire Glazing: Do not deliver or install fire-resistant glazing until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature conditions at occupancy levels during the remainder of the construction period.

1.13 WARRANTY

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

under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

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

- D. Special Warranty for Glazing Film Overlay: Manufacturer's standard form in which glazing film manufacturer agrees to replace glazing film units that deteriorate within specified warranty period. Deterioration of glazing film is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning glazing film contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period for Glazing Films: Five years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type
1. Obtain tinted glass from single source from single manufacturer.
 2. Obtain reflective-coated glass from single source from single manufacturer.
 3. Obtain insulating glass from single source from single manufacturer.
 4. Obtain laminated glazing from single source from single manufacturer using the same types of lites, plies, interlayers, and spacers for each laminated glazing type.
 5. Obtain decorative glazing film overlay from single source from single manufacturer for each product and installation method.
- B. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 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. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design glazing. Design glass, including comprehensive engineering analysis according to the ICC's International Building Code (IBC) listed on Drawings and ASTM E 1300 by a qualified professional engineer, using design criteria set forth in Article 2.2 and as follows:
1. Design Wind Pressures: As indicated on Drawings.
 2. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
 - a. Wind Design Data: As indicated on Drawings.
 3. Design Snow Loads: As indicated on Drawings.
 4. 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.
 5. Thickness of Patterned Glass: Base design of patterned glass on thickness at thinnest part of the glass.
 6. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
 7. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
- 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 6 mm thick.
 2. For laminated-glass lites, properties are based on products of construction indicated.
 3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.

4. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
 5. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
 6. Visible Reflectance: Center-of-glazing values, according to NFRC 300.
 7. Self-ignition temperature of 650 deg F or more when tested according to ASTM D 1929 on plastic sheets in thicknesses indicated for the Work.
 8. Smoke-Developed Index of 450 or less when tested according to ASTM E 84, or smoke density of 75 or less when tested according to ASTM D 2843 on plastic sheets in thicknesses indicated for the Work.
 9. Burning extent of 1 inch or less when tested according to ASTM D 635 at a nominal thickness of 0.060 inch or thickness indicated for the Work.
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
1. GANA Publications: "Glazing Manual."
 2. GANA Publications: "Laminated Glazing Reference Manual"
 3. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the Safety Glazing Certification Council (SGCC) or another certification agency acceptable to authorities having jurisdiction or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Fire-Resistive-Rated Glazing Labeling: Permanently mark fire-resistance-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, that the glazing is approved for use in walls, and the fire-resistance rating in minutes.
- D. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
- E. 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: 6.0 mm, except where specifically indicated otherwise.
 2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.
- F. Strength:
1. Where float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article.
 2. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article.
 3. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

- A. Clear Annealed Monolithic Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.
- B. Ultra Clear Monolithic Float Glass: ASTM C 1036, Type I, Class I (clear), Quality-Q3; and with visible light transmission of not less than 91 percent and solar heat gain coefficient of not less than 0.87.
- C. Tinted Annealed Monolithic Float Glass: ASTM C 1036, Type I, Class 2 (tinted), Quality-Q3.
- D. Heat-Strengthened Float Glass: ASTM C 1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
- E. Fully-Tempered Monolithic Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
- F. Low-E-Coated Vision Glass: Coated by pyrolytic process or vacuum deposition (sputter-coating) process, and complying with other requirements specified.
1. Basis-of-Design Product: Subject to compliance with requirements, provide products listed below or comparable products from other manufacturers meeting specified requirements, and which are submitted to and accepted by Architect prior to bidding.
 - a. Vitro; "Solarban 70 Solar Control (formerly Solarban 70 XL)"
 - 1) Low-E coating and Tint color selected shall match existing at each project site as determined by Architect and Owner.
 2. Kind: Kind CV (coated vision glass).
 3. Glass: Clear and tinted float. Refer to Glass Types Schedule at end of this Section.
 4. Performance Criteria: Refer to Glass Types Schedule at end of this Section.
- G. Ceramic-Coated Spandrel Glass: ASTM C 1048, Condition B, Type I, Quality-Q3, and complying with other requirements specified.
1. Glass: Clear float, heat strengthened.
 2. Ceramic Coating Color: Coating on fourth surface in color as selected by Architect from manufacturer's full range of custom options, 100 percent opaque coverage
 - a. Two coats minimum shall be applied. Final product shall be 100% opaque in color as selected by Architect. Additional coats may be required to provide performance indicated.
 3. Glass Types: Refer to Glass Type Schedule at end of this Section.
- H. Ceramic-Coated Vision Glass: ASTM C 1048, Condition C, Type I, Class 1 (clear) [or Class 2 (tinted)] as indicated, Quality-Q3; and complying with Specification No. 95-1-31 in GANA's "Engineering Standards Manual."
1. Glass: Clear float, heat strengthened.
 2. Ceramic Coating Color: Coating on [third] surface in color as selected by Architect from manufacturer's full range of custom options, percent of coverage varies with graphic.
- I. Reflective-Coated Vision Glass: ASTM C 1376, Kind CV (coated vision glass), coated by [pyrolytic process] [vacuum deposition (sputter-coating) process], and complying with other requirements specified.
1. Basis-of-Design Product: Subject to compliance with requirements, provide products listed below or comparable products from other manufacturers meeting specified requirements, and which are submitted to and accepted by Architect prior to bidding.
 - a. Vitro Architectural Glass; [**Architect to select**].
- J. Glass Types: Refer to Glass Type Schedules at end of this Section.

2.5 LAMINATED GLASS

- A. Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
1. Construction: Laminate glass with the following interlayer types to comply with interlayer manufacturer's written instructions.
 - a. Polyvinyl butyral interlayer.
 - b. As required to provide fire resistive glass types or fire protective glass types indicated.
 2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
 3. Interlayer Color: Clear unless otherwise indicated.
 4. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Laminated Glass Schedule" at end of this Section.
- B. Glass Types: Refer to Glass Type Schedules at end of this Section.

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.
 - 1. Sealing System: Dual seal, with polyisobutylene and silicone, primary and secondary seals, respectively.
 - 2. Perimeter Spacer: Aluminum with black, color anodic finish .
 - 3. Desiccant: Molecular sieve or silica gel, or a blend of both.
- B. Glass Types: Refer to Glass Type Schedules at end of this Section.

2.7 SPANDREL GLASS

- A. Ceramic-Coated Spandrel Glass: ASTM C 1048, Type I, Condition B, Quality-Q3.
 - 1. Glass: Clear float, heat-strengthened.
 - 2. Ceramic Coating Color: Coating on fourth surface in color as selected by Architect from manufacturer's full range of custom options, 100 percent coverage (apply in two if required to achieve full coverage).
- B. Silicone-Coated Spandrel Glass: ASTM C 1048, Type I, Condition C, Quality-Q3.
- C. Reflective-Coated Spandrel Glass: ASTM C 1376, Kind CS.
- D. Glass Types: Refer to Glass Type Schedules at end of this Section.

2.8 FIRE-RESISTIVE-RATED GLAZING

- A. Fire-Resistive-Rated Glazing: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-resistance ratings indicated, based on testing according to ASTM E 119 or UL 263.
 - 1. "W" denotes installed locations that must meet wall assembly criteria per ASTM E119.
 - 2. "OH" denotes installed locations that must meet fire window assembly criteria per NFPA 257.
 - 3. "D" denotes installed locations that must meet fire door assembly criteria per NFPA 252.
 - 4. "H" denotes installed locations that must meet fire door assembly hose stream test per NFPA 252.
 - 5. "T" denotes installed locations that must meet temperature rise requirement per NFPA 252.
 - a. Fire-resistance-rated glazing is tested the same as a wall assembly is tested and can be used in fire-resistance-rated walls. Size is limited only by size that was used in test.
- B. Fire-Resistive-Rated Glazing Labeling: Permanently mark fire-resistance-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, that the glazing is approved for use in walls, and the fire-resistance rating in minutes.
- C. Laminated Glass with Intumescent Interlayers: Laminated glass made from multiple plies of uncoated, ultraclear float glass; with intumescent interlayers; and complying with 16 CFR 1201, Category II.

2.9 FIRE-PROTECTIVE-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.
 - 1. "W" denotes installed locations that must meet wall assembly criteria per ASTM E119.
 - 2. "OH" denotes installed locations that must meet fire window assembly criteria per NFPA 257.
 - 3. "D" denotes installed locations that must meet fire door assembly criteria per NFPA 252.
 - 4. "H" denotes installed locations that must meet fire door assembly hose stream test per NFPA 252.
 - 5. "T" denotes installed locations that must meet temperature rise requirement per NFPA 252.
- B. Laminated Glass with Intumescent Interlayers: Laminated glass made from multiple plies of uncoated, ultraclear float glass; with intumescent interlayers; and complying with 16 CFR 1201, Category II and ASTM E119. Label shall be/meet W120 in accordance with the latest edition of the International Building Code, as adopted by the authority having jurisdiction. Rating shall not be less than 2 hours (120 minutes).

1. Basis-of-Design Product: Subject to compliance with requirements, provide Pilkington "Pyrostop", or comparable meeting specified requirements submitted to and accepted by Architect prior to bidding.
- C. Fire-Protective-Rated Glazing: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on positive-pressure testing according to NFPA 257 or UL 9, including the hose-stream test, and shall comply with NFPA 80.
 1. Fire-protection-rated glazing required to have a fire-protection rating of 20 minutes shall be exempt from the hose-stream test.
- D. Fire-Protective-Rated Tempered Glass: 6-mm thickness, fire-protection-rated tempered glass; and complying with 16 CFR 1201, Category II.
- E. Film-Faced Ceramic Glazing: Clear, ceramic flat glass; 5-mm thickness; faced on one surface with a clear glazing film; and complying with 16 CFR 1201, Category II.
- F. Laminated Ceramic Glazing: Laminated glass made from two plies of clear, ceramic glass; 8-mm total thickness; and complying with 16 CFR 1201, Category II.
- G. Laminated Glass with Intumescent Interlayers: Laminated glass made from multiple plies of uncoated, ultraclear float glass; with intumescent interlayers; and complying with 16 CFR 1201, Category II.
- H. Double Glazing Units with Clear Gel Fill: Double glazing units made from two lites of uncoated, fully tempered, ultraclear float glass; with a perimeter edge seal enclosing a cavity filled with optically clear, intumescent gel; and complying with 16 CFR 1201, Category II.
- I. Glass Types: Refer to Glass Type Schedules at end of this Section.

2.10 SPECIALTY / DECORATIVE GLAZING

- A. Glazing Film Overlay (088000.A93): Glass with decorative adhesive-backed colored film overlay. Use dimensionally stable, optically clear polyester film with UV stable, pressure-sensitive, clear adhesive back for adhering to glass and releasable protective backing.
 1. Basis-of-Design Products: Subject to compliance with requirements, provide 3M.; "Fasara"; or a comparable substitute product submitted to and accepted by Architect prior to bidding.
 - a. Substitutions for convenience will not be considered after bidding.
 2. Film Finish: Frost/Matte - Opaque White (SH2MAOW).
 3. Film Thickness: 142 microns.
 4. Product Description: Single or multi-layered decorative film products, applied to interior glass surfaces, consisting of (from outboard surface to inboard surface):
 - a. Removable release liner.
 - b. Pressure sensitive adhesive with integral ultraviolet absorbers.
 - c. Dyed or printed pattern layer of polyester film.
 5. Use: Suitable for interior applications.
 6. Accessories: Provide accessories complying with glazing film manufacturer's requirements for application indicated, with proven record of compatibility with surfaces contacted.
 - a. Adhesives: Pressure sensitive acrylic adhesive system.
 - b. Cleaners, Primers and Sealers: Types recommended by glazing film manufacturer.
- B. Spall-Resistant Film: Composite of clear polyvinyl butyral film and clear abrasion-resistant polyester film.
 1. Laminating Process: Factory laminate spall-resistant film to glazing assemblies to produce laminated lites free of foreign substances, air, and glass pockets.

2.11 GLAZING GASKETS

- A. 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.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned EPDM or silicone gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.

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.
- C. Fire-Rated Glazing: Provide glazing gaskets, glazing sealants, glazing tapes, setting blocks, spacers, edge blocks, and other glazing accessories that are compatible with glazing products and each other and are approved by testing agencies that listed and labeled fire-resistant glazing products with which products are used for applications and fire-protection ratings indicated.
 1. Glazing Sealants for Fire-Rated Glazing Products: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT. Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated.
 - a. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

2.12 GLAZING SEALANTS

- A. General:
 1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 2. Provide glazing sealants that are compatible with glazing products and each other and are approved by testing agencies that listed and labeled fire-resistant glazing products with which products are used for applications and fire-protection ratings indicated.
 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
- C. Glazing Sealants for Fire-Rated Glazing Products: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT. Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated.
 1. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- D. Security Sealant: Manufacturer's standard, nonsag, tamper-resistant sealant for joints with low movement complying with ASTM C 920, Grade NS, Class 12.5 or 25, Use NT, and with a Shore A hardness of at least 45 when tested according to ASTM C 661.

2.13 GLAZING TAPES

- A. General: Provide glazing tapes that are compatible with glazing products and each other and are approved by testing agencies that listed and labeled fire-resistant glazing products with which products are used for applications and fire-protection ratings indicated.
- B. 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, for glazing applications in which tape is subject to continuous pressure.
 2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- C. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
 1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.14 MISCELLANEOUS GLAZING MATERIALS

- A. General:
 1. Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a

- proven record of compatibility with surfaces contacted in installation.
 - 2. Provide glazing gaskets, glazing sealants, glazing tapes, setting blocks, spacers, edge blocks, and other glazing accessories that are compatible with glazing products and each other and are approved by testing agencies that listed and labeled fire-resistant glazing products with which products are used for applications and fire-protection ratings indicated.
- 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.

2.15 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.
 - 1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
 - a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. Grind smooth and polish exposed glass edges and corners.
 - 1. Provide ground and polished edges for glass doors and shelving at display cases.
 - 2. Provide ground and polished edges for glass shelving at merchandising walls.

PART 3 EXECUTION

3.1 EXAMINATION

- A. 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. Minimum required bite.
 - a. No less than 1/2" on all 4 sides.
 - 5. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. 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 leave visible marks in the completed Work.

3.3 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.
 - 1. Use methods approved by testing agencies that listed and labeled fire-resistive glazing or fire-protective glazing products.
- 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 includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair 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 inches.
 - 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-inch 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 face exterior or interior as specified.
- K. Set glass lites with proper orientation so that security films face exterior face exterior or interior as specified.
- L. Set glass lites with proper orientation so that coatings face fire side or protected side as specified.
- M. 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.
- N. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. 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.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended 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.

3.6 SEALANT GLAZING (WET)

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

3.7 GLAZING FILM OVERLAY INSTALLATION

- A. General: Comply with glazing film manufacturer's written instructions for preparation and installation.
 - 1. Apply squarely aligned to glass edges, uniformly smooth, and free from tears, air bubbles, wrinkles, and rough edges completely overlaying the back face of clean glass.
 - 2. Install film continuously in longest practicable lengths. Install with no gaps and no overlaps.
 - 3. If seamed, install with no gaps and no overlaps. Install seams vertical and plumb. Horizontal seams are not allowed.
 - 4. Delay removal of release liner from film until just before each piece of film is cut and ready for installation.
 - 5. Install film with mounting solution and custom cut to glass with neat, square corners and edges tight to window frame.
 - 6. Remove air bubbles, wrinkles, blisters and other defects, banding, thin spots and pinholes.
 - a. Where installed film does not meet this criteria, it shall be removed and replaced with new film.

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 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.
- F. Remove excess glazing film mounting solution at finished seams, perimeter edges and adjacent surfaces. Use cleaning methods recommended by glazing film manufacturer. Remove and replace films that cannot be cleaned.

3.9 HEAT TREATED MONOLITHIC GLASS SCHEDULE

- A. Glass Type 11 - Clear Fully Tempered monolithic float glass (088000.A11):
 - 1. 1/4 inch (6 mm).
 - 2. Visible Light Transmittance: 85 percent minimum.
 - 3. Provide safety glazing labeling.
- B. Glass Type 12 - Clear Fully Tempered monolithic float glass (088000.A12):
 - 1. 3/8 inch (9.5 mm).
 - 2. Visible Light Transmittance: 85 percent minimum.
 - 3. Provide safety glazing labeling.
- C. Glass Type 13 - Clear Fully Tempered monolithic float glass (088000.A13):
 - 1. 1/2 inch (12 mm).
 - 2. Visible Light Transmittance: 85 percent minimum.
 - 3. Provide safety glazing labeling.
 - 4. Provide polished edges when used for shelving.

3.10 LAMINATED GLASS SCHEDULE

- A. Glass Type 21 - Clear laminated glass (088000.A21)
 - 1. Basis-of-Design Product: Vitro Architectural Glass
 - 2. Two plies of fully tempered laminated float glass.
 - 3. Minimum Thickness of Each Glass Ply: 1/8-inch.
 - 4. Interlayer Thickness: 0.030 inch.
 - 5. Safety glazing required.

3.11 INSULATING GLASS SCHEDULE

- A. Glass Type 31 - Low-E-coated, clear insulating glass (088000.A31)
 - 1. Overall Unit Thickness: 1 inch (24 mm)
 - a. Minimum Thickness of Each Glass Lite: 1/4 inch (6 mm).
 - 2. Outdoor Lite: Heat strengthened clear and low-E coated float glass.
 - a. Low-E Basis of Design Product:
 - 1) Vitro Architectural Glass; "Solarban 70 Solar Control (formerly Solarban 70 XL)"

- b. Low-E Coating: Sputter coated on second surface.
- 3. Interspace Content: Air
- 4. Indoor Lite: Heat strengthened clear float glass.
- 5. Product Characteristics:
 - a. Visible Light Transmittance: 64 percent minimum.
 - b. Visible Light Reflectance (Exterior): 10 to 12 percent.
 - c. Winter Nighttime U-Factor (air): 0.28 maximum.
 - d. Solar Heat Gain Coefficient: 0.27 maximum.
 - e. Light-to-Solar Gain Ratio (LSG): 2.30 minimum.
 - f. Safety glazing required.

3.12 INSULATING FULLY-TEMPERED GLASS SCHEDULE

- A. Glass Type 41 - Low-E-coated, clear insulating fully tempered glass (088000.A41)
 - 1. Overall Unit Thickness: 1 inch (24 mm)
 - a. Minimum Thickness of Each Glass Lite: 1/4 inch (6 mm).
 - 2. Outdoor Lite: Fully tempered, clear and low-E coated float glass.
 - a. Low-E Basis of Design Product:
 - 1) Vitro Architectural Glass; "Solarban 70 Solar Control (formerly Solarban 70 XL)"
 - b. Low-E Coating: Sputter coated on second surface.
 - 3. Interspace Content: Air
 - 4. Indoor Lite: Fully tempered clear float glass.
 - 5. Product Characteristics:
 - a. Visible Light Transmittance: 64 percent minimum.
 - b. Visible Light Reflectance (Exterior): 13 to 14 percent.
 - c. Winter Nighttime U-Factor (air): 0.28 maximum.
 - d. Solar Heat Gain Coefficient: 0.27 maximum.
 - e. Light-to-Solar Gain Ratio (LSG): 2.30 minimum.
 - f. Safety glazing required.
- B. Glass Type 42 - Clear insulating fully tempered glass. (088000.A42)
 - 1. Basis-of-Design Product: Vitro Starphire
 - 2. Overall Unit Thickness: 1 inch
 - 3. Minimum Thickness of Each Glass Lite: 1/4 inch
 - 4. Indoor Lite 1: Clear fully tempered float glass.
 - 5. Interspace Content: Air
 - 6. Indoor Lite 2: Clear fully tempered float glass.
 - 7. Visible Light Transmittance: 91 percent minimum.
 - 8. Visible Light Reflectance: 8 percent.
 - 9. Safety glazing required.

3.13 SPANDREL GLASS SCHEDULE

- A. Glass Type 62 - Insulated Spandrel Glass. (088000.A62)
 - 1. Basis of Design Product: Subject to compliance with requirements, provide "MapeSpan" by Architectural Panels or a comparable product, with the following product characteristics, submitted to and accepted by Architect prior to bidding.
 - 2. Overall Thickness: 1 inch.
 - 3. Outdoor Lite: 1/4 inch tempered glass with cermaic frit on no. 2 surface.
 - a. Color: As selected by Architect from manufacturer full range of colors.
 - 4. Insulating Core: Polyisocyanurate.
 - a. Provide thickness as required to provide overall thickness indicated.
 - 5. Interior Substrate: 0.125 inch Hardboard.
 - 6. Interior Skin: 0.032 inch Metallic Fluoropolymer coated galvanized steel.
 - a. Color: "As selected by Architect from manufacturer full range of colors.
 - 7. Warranty:
 - a. Provide 25 year Lamination Warranty.
 - b. Provide 20 year Finish Warranty.
 - 8. Thermal Properties:

- a. R-Value: 19.38 minimum.
- b. U-Value: 0.05 maximum.

3.14 FIRE RESISTIVE GLASS GLAZING SCHEDULE

- A. Glass Type 72 - Fire-Resistive-Rated 90-Minute Interior Glass. (088000.A72)
 - 1. Glass Type 72.
 - 2. Multiple plies of uncoated, clear float glass; with intumescent interlayers; complying with testing requirements in 16 CFR 1201 for Category II materials. Product shall be non-heat conductive and have fire protection rating of not less than D-H-W-T, 90 minutes.
 - 3. Basis of Design Product: Subject to compliance with requirements, provide Safti First; SuperLite II-XL 90 or comparable product from manufacturers listed below, submitted to and accepted by Architect prior to bidding.
 - a. AGC, Pyrobel.
 - b. InterEdge, Inc., a subsidiary of AFG Industries, Inc.
 - c. Pilkington Group Limited (distributed by Technical Glass Products).
 - d. Vetrotech Saint-Gobain.

3.15 FIRE PROTECTIVE GLAZING SCHEDULE

- A. Glass Type 74 - Fire-Protective 20-Minute Rated Tempered Glass. (088000.A74)
 - 1. Glass Type 74.
 - 2. 1/4-inch-thick, fire-protection-rated tempered glass, complying with testing requirements in 16 CFR 1201 for Category II materials. Non-heat conductive and 20-minute rating minimum. Fire protective label per IBC shall be D-20.
 - 3. Basis of Design Products: Provide one of the following products:
 - a. Technical Glass Products; "Fireglass 20".
 - b. Safti First; "SuperLite I - 20".
 - c. McGrory Glass; "FireDefend 20".
- B. Glass Type 75 - Fire-Protective-Rated 45-Minute Interior Glass. (088000.A75)
 - 1. Glass Type 75.
 - 2. Multiple plies of uncoated, clear float glass; with intumescent interlayers; complying with testing requirements in 16 CFR 1201 for Category II materials. Product shall be non-heat conductive and have fire protection rating of not less than 45 minutes. Fire protective label per IBC shall be D-H-OH-45.
 - 3. Subject to compliance with requirements, provide products from one of the following:
 - a. Pilkington Group Limited (distributed by Technical Glass Products).
 - b. Safti First.
 - c. SCHOTT (distributed by McGrory Glass).
 - d. Vetrotech Saint-Gobain.

3.16 SPECIALTY / DECORATIVE GLAZING

- A. Glass Type 92: Low-E-coated, tinted, acid-etched insulating glass (088000.A92).
 - 1. Basis-of-Design Product: Vitro Architectural Glass; Solarban 70, Solar Control second surface.
 - 2. Overall Unit Thickness: 1 inch.
 - 3. Minimum Thickness of Each Glass Lite: 1/4 inch (6mm).
 - 4. Outdoor Lite: Tinted and sputter-coated float glass.
 - a. Basis-of-Design Product: Vitro Architectural Glass; Solarban 70, Solar Control second surface.
 - b. Tint Color: Solarblue.
 - c. Low-E Coating: Sputtered second surface.
 - d. Visible Light Transmittance: 42 percent minimum.
 - e. Visible Light Reflectance (out): 8 percent.
 - f. Winter Nighttime U-Factor: 0.28 maximum (with Argon Gas).
 - g. Solar Heat Gain Coefficient: 0.23 maximum.
 - h. Light to Solar Gain Ratio (LSG): Not less than 1.83.
 - 5. Indoor Lite: Fully tempered clear float glass.
 - a. Basis of Design: Walker Textures, acid-etched velour texture.

- b. Tint color: Clear
 - c. Visible Light Transmittance: 91%.
 - d. Visible Light Reflectance: 8%.
 - e. Total Luminous Transmittance: 88.44%.
 - f. Diffuse Transmittance: 79%.
6. Interspace Content: Argon Gas

END OF SECTION 088000

This page intentionally left blank

SECTION 092116 - NON-STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Non-load-bearing steel framing systems for interior partitions (092116.A01).
 - 2. Suspension systems for interior ceilings, bulkheads, soffits, and exterior soffits.
 - a. For spans exceeding 8 feet in any direction refer to Section 054000 for design requirements.
 - 3. Grid suspension systems for gypsum board ceilings (092116.A06).
- B. Related Requirements:
 - 1. Section 012300 "Alternates" for description of alternates affecting work of this Section.
 - 2. Section 054000 "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; and ceiling joists. In addition, for all interior soffits and ceilings with an unsupported span in any direction exceeding 8 feet.
 - 3. Section 092117 "Gypsum Board Shaft Wall Assemblies" for gypsum board shaft wall assemblies.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Studs and Runners: Provide documentation that framing members' certification is according to SIFA's "Code Compliance Certification Program for Cold-Formed Steel Structural and Non-Structural Framing Members."

1.3 INFORMATIONAL SUBMITTALS

- A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association, the Steel Framing Industry Association or the Steel Stud Manufacturers Association.
- B. Evaluation Reports: For embossed steel studs and runners and firestop tracks, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated or where not specifically indicated, as specified below, according to ASTM E 119 by an independent testing agency acceptable to authorities having jurisdiction.
 - 1. Provide fire-resistance-rated assemblies identical to those specified by reference to design designations in UL "Fire Resistance Directory" or in listing of other testing and agencies acceptable to authorities having jurisdiction. Design designation from UL are minimum requirements. Where more stringent requirements are indicated or specified, the more stringent requirements shall take precedence.
 - a. One Hour non-load bearing partitions: UL U 465.
 - b. Two Hour non-load bearing partitions: UL U 411.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
- C. Horizontal Deflection: For wall assemblies, limited to 1/360 of the wall height based on horizontal loading of 5 lbf/sq. ft..

2.2 FRAMING SYSTEMS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
 - 2. Protective Coating: ASTM A 653/A 653M, G40 or coating with equivalent corrosion resistance of ASTM A 653/A 653M, G40, hot-dip galvanized unless otherwise indicated.
- C. Studs and Runners (092116.A01): ASTM C 645. Use either steel studs and runners or embossed steel studs and runners.
 - 1. Steel Studs and Runners:
 - a. Minimum Base-Metal Thickness: 0.0296 inch.
 - b. Provide 0.0296 inch minimum base metal thickness for studs and runners at walls indicated to receive tile, walls indicated to receive abrasion-resistant drywall, impact-resistant drywall, and at other locations indicated.
 - c. Depth: 3-5/8 inches, unless otherwise indicated.
 - 2. Embossed Steel Studs and Runners:
 - a. Minimum Base-Metal Thickness: 0.0147 inch.
 - b. Provide 0.025 inch minimum base metal thickness for studs and runners at walls indicated to receive tile, walls indicated to receive abrasion-resistant drywall, impact-resistant drywall, and at other locations indicated.
 - c. Depth: 3-5/8 inches, unless specifically indicated otherwise.
- D. Slip-Type Head Joints: Where indicated, provide one of the following:
 - 1. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch-deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit over inside runner and one gauge heavier than gauge for wall construction indicated.
- E. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of structure 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.
- F. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
 - 1. Minimum Base-Metal Thickness: 0.0296 inch.
- G. Furring Channels (Furring Members) (09216.A03):
 - 1. Cold-Rolled Channels: 0.0538-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges, 3/4 inch deep.
- H. Cold-Rolled Channel Bridging: Steel, 0.0538-inch minimum base-metal thickness, with minimum 1/2-inch-wide flanges.
 - 1. Depth: 1-1/2 inches.
 - 2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch-thick, galvanized steel.
- I. Hat-Shaped, Rigid Furring Channels (092116.A02): ASTM C 645.
 - 1. Minimum Base-Metal Thickness: 0.0179 inch.
 - 2. Depth: 7/8 inch, unless specifically indicated otherwise.
- J. Z-Shaped Furring (092116.A04): With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.
- K. Steel Column Furring System: Subject to compliance with requirements provide "LocTite – Fast Frame Column Framing System" or a comparable product submitted to and accepted by Architect prior to bidding.

2.3 SUSPENSION SYSTEMS

- A. Hanger Attachments to Concrete:

1. Anchors: Capable of sustaining a load equal to 5 times that imposed as determined by ASTM E488.
 - a. Type: Post installed, chemical anchor or post-installed, expansion anchor.
 2. Power-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, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- B. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.
- C. Flat Hangers: Steel sheet, 1 by 3/16 inch by length indicated.
- D. Carrying Channels (092116.A05:) Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch and minimum 1/2-inch-wide flanges, 3/4 inch deep. Hot-dip galvanize carrying channels in exterior locations to at least G40 requirements.
1. Depth: 2 inches.
- E. Grid Suspension System for Gypsum Board Ceilings and Soffits (092116.A06): At Contractor's option, pre-manufactured grid suspension systems may be used. Grid suspension system shall comply with ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Armstrong World Industries, Inc; Drywall Grid Systems.
 - b. Chicago Metallic Corporation; 640/660 Drywall Ceiling Suspension.
 - c. United State Gypsum Company; Drywall Suspension System.
- F. Furring Channels (Furring Members) (092116.A03) :
1. Cold-Rolled Channels: 0.0538-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges, 3/4 inch deep.
 2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329 inch.
 3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.
- G. Hat-Shaped, Rigid Furring Channels (092116.A02): ASTM C 645, 7/8 inch deep.
1. Minimum Base-Metal Thickness: 0.0179 inch.
- H. Z-Shaped Furring (092116.A04): With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.

2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Vertical Isolation Strips at Exterior Walls: Provide one of the following:
1. Asphalt-Saturated Organic Felt: ASTM D 226/D 226M, Type I (No. 15 asphalt felt), nonperforated.
- C. Isolation Strips beneath Runner Tracks at Exterior Walls: Provide the following:
1. Polyethylene-sheet-backed rubberized asphalt membrane, 40 mils thick. Field cut to match widths of runners.
- D. Resilient Sound Isolation Clips: Subject to compliance with requirements, provide "RSIC-1" by PAC International or a comparable product submitted to and accepted by Architect prior to bidding with the following product characteristic.
1. Rubber Isolator
 - a. Natural and Manufactured rubber compound
 - b. Molded to isolate ferrule from clip
 - c. Minimum of 12 micro-vibration controlling pedestal at point of contact with framing member.
 - d. Manufactured to ASTM D2000, M2 AA 510 A13, which includes:
 - 1) Hardness, ASTM D2240, Shore A: 47 min
 - 2) Modulus 300 Percent, ASTM D412, Die C: 5.3 MPa.

- 3) Tensile Strength, ASTM D412, Die C: 11.2 MPa
 - 4) Elongation at Break, ASTM D573: 454 percent.
- 2. Clip: Galvanized or aluminum-zinc coated steel, 16 gauge.
- 3. Ferrule: Zinc-electroplated steel.
- 4. Projection: 1-5/8 inches from supporting structure, when 7/8-inch drywall furring channels are used.
- E. Deck-Suspended Ceiling Hangers: Subject to compliance with requirements, provide Kinetics Noise Control; "ICC Deck-Supported Ceiling Isolation Hanger". Comparable products from other manufacturers will be considered.
 - 1. Hanger shall include a 1-inch rated deflection spring in series with a neoprene cup.
 - 2. Hanger shall be equipped with a clip/leveling rod assembly, designed to receive a 16 gauge steel carrying channel.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
 - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.
- B. Coordination with Sprayed Fire-Resistive Materials:
 - 1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
 - 2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that are required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754.
 - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
 - 1. Single-Layer Application: 16 inches o.c. unless otherwise indicated.

2. Multilayer Application: 16 inches o.c. unless otherwise indicated.
 3. Tile Backing Panels: 16 inches o.c. unless otherwise indicated.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
 - C. Where runner tracks for exterior walls are installed directly against concrete or dissimilar metals, install rubberized asphalt isolation strips between bottom of runner track and concrete.
 - D. Install studs so flanges within framing system point in same direction.
 - E. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs, having a minimum base metal thickness of 0.0296 inches, at each jamb.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
 - a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
 5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
 - F. Direct Furring:
 1. Screw to wood framing.
 2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
 - G. Z-Shaped Furring Members:
 1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced 24 inches o.c.
 2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
 3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.
 - H. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.5 INSTALLING SOUND ISOLATION CLIPS AND CEILING HANGERS

- A. Install ceiling hangers, resilient sound isolation clips and drywall furring channels in accordance with manufacturer's written instructions.
 1. Locate resilient sound isolation clips maximum of 8 inches from ends of dry wall furring channels.
- B. Mechanically fasten resilient sound isolation clips to structure with screws, bolts, or expansion anchors, dependent upon structure.
- C. Fire-Resistive Design Assemblies:
 1. Install as specified in UL Fire Resistance Directory, where required.
 2. Do not arbitrarily add resilient sound isolation clips to fire-rated assemblies.
- D. Space resilient sound isolation clips at maximum of 24 inches by 48 inches on center for walls and ceilings.

- E. Do not exceed design load (pull and shear) of 36 pounds per isolation clip.
- F. Stagger isolation clip installation, so dead load is supported by all support members.
- G. Space ceiling hangers as recommended by manufacturer.
 - 1. Do not exceed design load (pull and shear) of ceiling hanger.
- H. Splicing Drywall Furring Channels:
 - 1. Splice drywall furring channels with minimum of 6-inch (150-mm) laps.
 - 2. Secure laps with 2 framing screws or 18 gauge tie wire double wrapped.
 - 3. Locate splices between resilient sound isolation clips.
 - 4. Do not locate splices on resilient sound isolation clips.
- I. Install resilient sound isolation clips on 1 side of wall assembly, unless otherwise indicated on the drawings.
- J. Flanking Noise:
 - 1. Review installation details to prevent structure-borne flanking noise.
 - 2. Do not allow drywall furring channels or gypsum board to contact foreign materials, including floors, ceilings, or wall framing members.
- K. Ensure metal ferrule of resilient sound isolation clips is in firm contact with structural member.
- L. Gypsum Board:
 - 1. Install gypsum board in vertical or horizontal position with 1/8-inch to 1/4-inch gap around perimeter for acoustical sealant application.
 - 2. Install gypsum board in accordance with ASTM C 840 as specified in Section 092900.
- M. Acoustical Sealant:
 - 1. Seal potential air leaks with acoustical sealant to achieve best Field Sound Transmission Class (FSTC).
 - 2. Seal electrical outlets and penetrations with acoustical sealant.
 - 3. Apply fire-rated acoustical sealant at locations where fire-rated assembly is required.
- N. Putty Pad Sealant: Acoustically seal with putty pads, electrical boxes in walls and ceilings in which resilient sound isolation clips are used.

3.6 INSTALLING SUSPENSION SYSTEMS

- A. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
 - 1. Hangers: 48 inches o.c.
 - 2. Carrying Channels (Main Runners): 48 inches o.c.
 - 3. Furring Channels (Furring Members): 16 inches o.c.
- B. Suspend hangers from building structure as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - a. 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 locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
 - 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 - 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, 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. Do not attach hangers to steel roof deck.

6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- C. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- D. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- E. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092116

This page intentionally left blank

SECTION 092117 - GYPSUM BOARD SHAFT WALL ASSEMBLIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Gypsum board shaft wall assemblies (092117.A01) in vertical applications.
 - 2. Gypsum board shaft wall assemblies (092117.A01) in horizontal applications.
- B. Related Requirements:
 - 1. Section 054000 "Cold-Formed Metal Framing" for interior non-load-bearing wall framing.
 - 2. Section 092116 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.

1.2 ACTION SUBMITTALS

- A. Product Data: For each component of gypsum board shaft wall assembly.

1.3 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For shaft wall assemblies, from ICC-ES.

1.4 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.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or with gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install interior products until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, or mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: Provide materials and construction identical to those of assemblies tested according to ASTM E 90 and classified according to ASTM E 413 by a testing and inspecting agency.

2.2 GYPSUM BOARD SHAFT WALL ASSEMBLIES (092117.A01)

- A. Fire-Resistance Rating: As indicated on Drawings.
- B. Studs: Manufacturer's standard profile for repetitive members, corner and end members, and fire-resistance-rated assembly indicated.
 - 1. Selection of studs shall be of depth and thickness required for application in vertical and horizontal conditions and spans as indicated on drawings. The following are minimum requirements.
 - a. Depth: 2-1/2 inches, unless indicated otherwise.
 - b. Minimum Base-Metal Thickness: 0.0329 inch.
- C. Runner Tracks: Manufacturer's standard J-profile track with manufacturer's standard long-leg length, but at least 2 inches long and matching studs in depth.
 - 1. Minimum Base-Metal Thickness: Matching steel studs.
- D. Firestop Tracks: Provide firestop track at head of shaft wall on each floor level.
- E. Room-Side Finish: Gypsum Board Type X.
- F. Shaft-Side Finish: Gypsum shaftliner board, moisture and mold-resistant Type X.

2.3 PANEL PRODUCTS

- A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
- B. Gypsum Shaftliner Board, Moisture and Mold-Resistant Type X: ASTM C 1396/C 1396M; manufacturer's proprietary fire-resistive liner panels with moisture- and mold-resistant core and surfaces.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. American Gypsum; MBloc Shaft Liner with Mold & Moisture Resistance.
 - b. CertainTeed Corp.; M2Tech Shaftliner.
 - c. Georgia-Pacific Gypsum LLC, Subsidiary of Georgia Pacific; Dens-Glass Ultra Shaftliner.
 - d. Lafarge North America, Inc.; Firecheck Moldcheck Type X Shaftliner.
 - e. National Gypsum Company; Gold Bond Brand Fire-Shield Shaftliner XP.
 - f. PABCO Gypsum; Pabcore Mold Curb Shaftliner Type X.
 - g. USG Corporation; Sheetrock Brand Mold Tough Gypsum Liner Panel.
 - 2. Thickness: 1 inch.
 - 3. Long Edges: Double bevel.
 - 4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
- C. Gypsum Board: As specified in Section 092900 "Gypsum Board."

2.4 NON-LOAD-BEARING STEEL FRAMING

- A. Steel Framing Members: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
 - 1. Protective Coating: ASTM A 653/A 653M, G40, hot-dip galvanized.
- B. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated.

2.5 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with manufacturer's written recommendations.
- B. Trim Accessories: Material and shapes as specified in Section 092900 "Gypsum Board" that comply with gypsum board shaft wall assembly manufacturer's written recommendations for application indicated.

- C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
- D. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions.
 - 1. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing according to ASTM E 488 conducted by a qualified testing agency.
 - 2. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing according to ASTM E 1190 conducted by a qualified testing agency.
- E. Sound Attenuation Blankets: As specified in Section 092900 "Gypsum Board."
- F. Acoustical Sealant: As specified in Section 092900 "Gypsum Board."

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates to which gypsum board shaft wall assemblies attach or abut, with Installer present, including hollow-metal frames, cast-in anchors, and structural framing. Examine for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with requirements of fire-resistance-rated assemblies indicated, manufacturer's written installation instructions, and ASTM C 754 other than stud-spacing requirements.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.
- C. Building Expansion Joints: Frame both sides of expansion joints with furring and other support.
- D. Install supplementary framing around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, handrails, and similar items.
 - 1. Reinforcing: Where handrails directly attach to gypsum board shaft wall assemblies, provide galvanized steel reinforcing strip with 0.033-inch minimum thickness of base metal (uncoated), accurately positioned and secured behind at least one layer of face panel.
- E. Penetrations: Install supplementary steel framing around perimeter of penetration behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.
- F. Isolate perimeter of gypsum panels from building structure, while maintaining continuity of fire-rated construction.
- G. Firestop Tracks: Install to maintain continuity of fire-resistance-rated assembly indicated.
- H. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect while maintaining fire-resistance rating of gypsum board shaft wall assemblies.
- I. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.
- J. Remove and replace panels that are wet, moisture damaged, or mold damaged.

3.3 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, or mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092117

SECTION 092900 - GYPSUM BOARD

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior gypsum board.
 - a. Gypsum Board, Type X (092900.A02).
 - b. Impact-Resistant Gypsum Board (092900.A05).
 - c. Mold-Resistant Gypsum Board (092900.A06).
 - d. Flexible Gypsum Board (092900.A16).
 - 2. Tile backing panels (092900.A10).
 - 3. Expansion control joint (092900.A12).
 - 4. Aluminum reveal trim (092900.A13).
 - 5. Sound attenuation blankets (092900.A14).
 - 6. Acoustical sealant for sound control assemblies (092900.A15).
- B. Related Requirements:
 - 1. Section 012300 "Alternates" for description of alternates effecting work of this Section.
 - 2. Section 061600 "Sheathing" for gypsum sheathing for exterior walls.
 - 3. Section 092116 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.
 - 4. Section 092117 "Gypsum Board Shaft Wall Assemblies" for metal shaft-wall framing, gypsum shaft liners, and other components of shaft-wall assemblies.
 - 5. Division 26 Sections for electrical connections to lighting components within trim pieces.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For the following products:
 - 1. Trim Accessories: Full-size Sample in 12-inch-long length for each trim accessory indicated.
- C. Samples for Verification: For the following products:
 - 1. Trim Accessories: Full-size Sample in 12-inch-long length for each trim accessory indicated.

1.3 QUALITY ASSURANCE

- A. Integrated Field Sample: Build mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Build integrated field sample for the following:
 - a. Each level of gypsum board finish indicated for use in exposed locations.
 - b. Each texture finish indicated.
 - 2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
 - 3. Simulate finished lighting conditions for review of mockups.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 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.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

- A. Manufacturer: Subject to compliance with requirements, provide products by one of the following:
 - 1. American Gypsum.
 - 2. CertainTeed Corp.
 - 3. Lafarge North America, Inc.
 - 4. National Gypsum Company.
 - 5. USG Corporation.
- B. Gypsum Board, Type X (092900.A02): ASTM C 1396/C 1396M.
 - 1. Thickness: 5/8 inch.
 - 2. Long Edges: Tapered and featured (rounded or beveled) for prefilling.
- C. Impact-Resistant Gypsum Board (092900.A05): ASTM C 1629/C 1629M.
 - 1. Core: 5/8 inch, Type X.
 - 2. Long Edges: Tapered.
 - 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
 - 4. Physical Properties when tested in accordance with ASTM C 1629:
 - a. Surface Abrasion Resistance: Level 3.
 - b. Indentation Resistance: Level 1, minimum.
 - c. Soft-Body Impact Resistance: Level 3.
 - d. Hard-Body Impact Resistance: Level 3.
- D. Mold-Resistant Gypsum Board (092900.A06): ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.
 - 1. Core: 5/8 inch, Type X.
 - 2. Long Edges: Tapered.
 - 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

- E. Flexible Gypsum Board (092900.A16): ASTM C 1396/C 1396M. Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.
 - 1. Thickness: 1/4 inch.
 - 2. Long Edges: Tapered.

2.4 TILE BACKING PANELS

- A. Cementitious Backer Units (092900.A10): ANSI A118.9 and ASTM C 1288 or ASTM C 1325, with manufacturer's standard edges.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide one of the following products or a comparable product, with the following product characteristics, submitted to and accepted by Architect prior to bidding.
 - a. C-Cure.; C-Cure Board 990
 - b. National Gypsum Company.; Permabase Cement Board.
 - c. USG Corporation.; DUROCK Cement Board.
 - 2. Thickness: 5/8 inch.
 - 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.5 TRIM ACCESSORIES

- A. Interior Trim (092900.A11): ASTM C 1047.
 - 1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
 - a. At Contractor's option, interior trim may be a structural laminate drywall corner system using "No-Coat" products as manufactured by Certainteed or a comparable product submitted to and accepted by Architect prior to bidding.
 - 2. Shapes:
 - a. Cornerbead.
 - b. L-Bead: L-shaped; exposed long flange receives joint compound.
 - c. J-Bead: J-shaped; exposed short flange does not receive joint compound.
 - d. Expansion (control) joint.
 - e. Wall end cap: Provide "Fast Cap" as manufactured by Trim-Tex Drywall Products.

2.6 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
 - 1. Interior Gypsum Board: Paper.
 - 2. Tile Backing Panels: As recommended by panel manufacturer.
 - 3. Cementitious Backer Units: As recommended by backer unit manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
 - 3. Fill Coat: For second coat, use drying-type, all-purpose compound.
 - 4. Finish Coat: For third coat, use drying-type, all-purpose compound.
 - 5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.
 - a. Where specifically indicated on Drawings, provide a setting-type, sandable topping compound for trowel-applied skim coat.
- D. Joint Compound for Tile Backing Panels:
 - 1. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.7 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
 - 1. Laminating adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Laminating adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
 - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
 - 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."
- E. Sound-Attenuation Blankets (092900.A14): ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
 - 2. Recycled Content of Blankets: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- F. Acoustical Impaling clips (092900.A14): Galvanized sheet metal impaling clips each with 8 spikes that stick onto the fiberglass and hold the panel in place; 2-1/8" x 1-1/2"; install by either drywall screws or attached with adhesive as recommended by the manufacturer.
- G. Acoustical Joint Sealant (092900.A15): Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide one of the following products or a comparable product, with the following product characteristics, submitted to and accepted by Architect prior to bidding.
 - a. Accumetric LLC.; BOSS 824 Acoustical Sound Sealant.
 - b. Pecora Corporation.; AIS-919.
 - c. USG Corporation.; SHEETROCK Acoustical Sealant.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.
 - 4. Where ceilings in showers abut adjacent walls, Provide 1/4- to 3/8-inch-wide spaces and trim edges with plastic edge trim to allow for sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch-wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Type X: Vertical and horizontal surfaces of walls, soffits, bulkheads and ceiling surfaces unless otherwise indicated.
 - 2. Flexible Type: Apply in double layer at curved assemblies and at other locations as indicated on Drawings.
 - 3. Impact-Resistant Type: Refer to Drawings for locations required.
 - 4. Tile Backing Panels: Restroom walls indicated to receive tile.
 - 5. Moisture and Mold Resistant Type X: Exterior walls and restrooms, except at walls indicated to receive tile. Restrooms and wet walls (such as behind electric drinking fountains, behind janitor's sink and sinks).
- B. Single-Layer Application:
 - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
 - 2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
 - 3. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
 - 4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
 2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
 3. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
 4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.
- D. Curved Surfaces:
1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch-long straight sections at ends of curves and tangent to them.
 2. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.

3.4 APPLYING TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A108.11
1. Locations:
 - a. At shower ceiling locations and vertical surfaces indicated to receive tile
 - b. At showers, tubs, and where indicated
 - c. At locations indicated to receive tile.
- B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
1. Cornerbead: Use at outside corners.
 2. L-Bead: Use where indicated.
 3. U-Bead: Use at exposed panel edges.
- D. Interior Trim – Structural Laminate: Provide at all outside corners within 8'-0" of floor surface.
- E. Aluminum Trim: Install in locations indicated on Drawings.
- F. Wall-to-Mullion Sound Seals: Install according to manufacturer's written instructions at locations indicated on Drawings.

3.6 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 2. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
 - a. Primer and its application to surfaces are specified in other Division 09 Sections.
 3. Level 5:
 - a. Provide at the following locations:
 - 1) Behind custom wallcovering murals
 - 2) Behind areas to receive dry erase paint
 - 3) At walls perpendicular to exterior glazing.
 - 4) Down Light / Wall Washers
 - 5) At WGX, areas to receive wall graphics.
 - 6) Where indicated on Drawings.
 - b. Primer and its application to surfaces are specified in Other Division 09 Sections.
- E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.7 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

This page intentionally left blank

SECTION 093000 - TILING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Ceramic and Porcelain tile (093000.A01).
 - 2. Waterproof membrane.
 - 3. Crack isolation membrane.
 - 4. Metal edge strips (093000.A04).
- B. Related Requirements:
 - 1. Section 042000 "Unit Masonry" for references to installation over concrete masonry units.
 - 2. Section 079200 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
 - 3. Section 092900 "Gypsum Board" for tile backer units.

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. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, ANSI A108.17, 108.18, 108.19, 108.20, A118, A136 which are contained in its "Specifications for Installation of Ceramic Tile."
- C. ANSI A 137.1, American National Standard Specifications for Ceramic Tile.
- D. ANSI A 137.2, American National Standard Specifications for Glass Tile.
- E. ANSI A 37.3, American National Standards Specifications for Gauged Porcelain Tile and Gauged Porcelain Tile Panel/Slabs.
- F. Face Size: Actual tile size, excluding spacer lugs.
- G. Module Size: Actual tile size plus joint width indicated.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.4 PERFORMANCE REQUIREMENTS

- A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:
 - 1. Level Surfaces: Minimum 0.60.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

1. Show extent and locations for waterproof membrane and crack isolation membrane.
- C. Samples for Initial Selection: For tile, grout, and accessories involving color selection.
- D. Samples for Verification:
1. Full-size units of each type and composition of tile and for each color and finish required.
 2. Full-size units of each type of trim and accessory for each color and finish required.
 3. Metal edge strips in 6-inch lengths.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- C. Product Certificates: For each type of product.
- D. Product Test Reports: For tile-setting and -grouting products.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Tile and Trim Units: Furnish one unopened box, but not more than 2 percent, for each type, composition, color, pattern, and size indicated.

1.8 QUALITY ASSURANCE

- A. Source Limitations for Tile: Obtain tile of each type and color or finish from one source or producer.
1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:
1. Crack isolation membrane.
 2. Joint sealants.
 3. Metal edge strips.
- D. Installer Qualifications:
1. Installer is a five-star member of the National Tile Contractors Association or a Trowel of Excellence member of the Tile Contractors' Association of America.
 2. Installer's supervisor for Project holds the International Masonry Institute's Foreman Certification.
 3. Installer employs Ceramic Tile Education Foundation Certified Installers or installers recognized by the U.S. Department of Labor as Journeyman Tile Layers.
- E. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Build mockup of each type of wall tile installation.
 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- F. Mockups/Field Samples: Build mockups/field samples to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Build mockups/field samples of each type of **restroom wall tile installation**. Mockup/field sample shall extend to floor to demonstrate transition from wall to floor.
 2. Build mockups/field samples of each type of wall tile installation.

3. Approved mockups/field samples may become part of the completed Work if undisturbed at time of Substantial Completion.

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 liquid materials in unopened containers and protected from freezing.
- D. 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 FIELD CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:
 1. Level Surfaces: Minimum 0.60.
- B. Dynamic Coefficient of Friction: for tile installed on walkway surfaces, provide product with the following values as determined by testing identical products per ANSI A137.1.
 1. Level Surfaces: Minimum 0.42.

2.2 MANUFACTURERS

- A. Source Limitations for Tile: Obtain tile of each type from single source or producer.
 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.
 1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.
 2. Obtain waterproof membrane and crack isolation membrane, except for sheet products, from manufacturer of setting and grouting materials.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer:
 1. Metal edge strips.

2.3 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
 1. Provide tile complying with Standard grade requirements.
 2. Dynamic coefficient of Friction (DCOF) for Floor Tile: Greater than or equal to 0.42 per ANSI A137.1.

- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- D. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by pre-coating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

2.4 CERAMIC AND PORCELAIN TILE PRODUCTS

- A. Tile Type (093000.A01 – **T1, T2, T4**):
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Daltile; "Classic Color Wheel."
 - a. Comparable products from other manufacturer's, meeting specified requirements, colors and shape, will be considered when submitted to and accepted by Architect prior to bidding.
 - 2. Composition: Glazed ceramic tile.
 - 3. Size: Refer to Material Finish Legend.
 - 4. Thickness: 5/16 inch.
 - 5. Tile Color and Pattern: As indicated by manufacturer's designations on Material Finish Legend.
 - 6. Grout Color: As selected by Architect from manufacturers full range.
 - 7. DCOF: ≥ 0.42 .
 - 8. Performance Characteristics:
 - a. Water Absorption: ASTM C 373, $<20\%$.
 - b. Breaking Strength: ASTM C 648, 120-230 lbs.
 - c. Scratch Hardness: MOHS, 4.0 - 6.0.
 - d. Chemical Resistance: ASTM C 650, Resistant.
 - 9. Metal Trim: Provide Schluter trim as indicated in Paragraph 2.8.C of this section.
- B. Tile Types (093000.A01 – **T3**)
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Daltile; "Volume 1.0" glazed porcelain tile.
 - a. Comparable products from other manufacturer's, meeting specified requirements, colors and shape, will be considered when submitted to and accepted by Architect prior to bidding.
 - 2. Composition: Impervious porcelain.
 - 3. Shapes: Refer to Drawings.
 - 4. Sizes: Refer to Material Finish Legend.
 - 5. Thickness: 5/16 inch.
 - 6. Tile Colors and Patterns: As indicated by manufacturer's designations on Interior Finish Legend.
 - 7. Grout Color: As specified later in this Section.
 - 8. DCOF: ≥ 0.42 .
 - 9. Metal Trim: Provide Schluter trim as indicated in Paragraph 2.8.C of this section.
 - 10. Performance Characteristics:
 - a. Water Absorption: ASTM C 373, $<0.5\%$.
 - b. Breaking Strength: ASTM C 648, >275 lbs.
 - c. Scratch Hardness: MOHS, 8.0.
 - d. Chemical Resistance: ASTM C 650, Resistant.
- C. Tile Type (093000.A01 – **T5**):
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Tilebar; "Kenridge Ribbon Maple" porcelain wood look wall tile.
 - a. Comparable products from other manufacturer's, meeting specified requirements, colors and shape, will be considered when submitted to and accepted by Architect prior to bidding.
 - 2. Composition: Colorbody porcelain
 - 3. Finish: Matte
 - 4. Size: 24 inch by 48 inch.
 - 5. Thickness: 10.5 mm, 10.8mm, 11.2 mm
 - 6. Tile Color and Pattern: As indicated by manufacturer's designations on Material Finish Legend.
 - 7. Grout Color: As selected by Architect from manufacturers full range.

8. Performance Characteristics:
 - a. Water Absorption: ASTM C 373, <0.5%.
 - b. Scratch Hardness: MOHS, 5.0.
 - c. Chemical Resistance: ASTM C 650, Resistant.
9. Metal Cove Trim:
 - a. Provide Schluter; Dilex AHKA, refer to drawings for locations and Paragraph 2.9 C of this Section.

2.5 WATERPROOF MEMBRANE AND CRACK ISOLATION MEMBRANE (093000.A03)

- A. Fluid-Applied Waterproofing/Crack Isolation Membrane: Liquid-latex rubber or elastomeric polymer.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide Laticrete; "Hydro Ban" waterproofing and crack isolation membrane. Comparable products from other manufacturers will be considered when submitted to and accepted by Architect prior to bidding.
 2. Product Description and Characteristics:
 - a. Single component, self-curing liquid rubber polymer that forms a flexible and seamless membrane.
 - 1) Meets ANSI A118.10 - Membranes / Water Proofing and ANSI A118.12 - Membranes / Crack Isolation.
 - b. Thickness: Not less than 0.020 inches when cured.
 - c. Anti-fracture protection up to 1/8 inch.
 - d. Extra Heavy Service rating per TCNA.
 3. Adhesives shall have a VOC content of 65 g/L or less.
 4. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.6 SETTING MATERIALS

- A. Improved Modified Dry-Set Mortar (Thinset and LHT Mortars): ANSI A118.15.
 1. Provide prepackaged, dry-mortar mix containing dry, redispersable, vinyl acetate or acrylic additive to which only water must be added at Project site.
 2. For large & heavy tile (LHT) use mortar meeting LHT requirements.
 3. For wall applications, provide mortar that complies with requirements for non-sagging mortar in addition to the other requirements in ANSI A118.15.
- B. Water-Cleanable, Tile-Setting Epoxy: ANSI A118.3.
 1. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 and 212 deg F, respectively, and certified by manufacturer for intended use.

2.7 GROUT MATERIALS

- A. High-Performance Polymer-Modified Tile Grout: Meeting or exceeding ANSI A118.7. Grout shall be chemical and stain resistant type. Polymer modified with ethylene vinyl acetate or acrylic additive, in dry, re-dispersible form, pre-packaged with other dry ingredients. Grout shall be fast setting, highly stain resistant, crack and shrink resistant, and mold /mildew resistant.
 1. Basis-of-Design Product: MAPEI Corporation, "KeraColor S Sanded Grout" or comparable product from other manufacturers listed below, meeting specified requirements, submitted to and accepted by Architect prior to bidding.
 - a. Ardex.
 - b. Bostik, Inc.
 - c. Custom Building Products.
 - d. LATICRETE International, Inc., "Permacolor Grout"
 - e. Mer-Kote Products, Inc.
 - f. Southern Grouts & Mortars, Inc.
 - g. Summitville Tiles, Inc.
 - h. TEC; a subsidiary of H. B. Fuller Company.
 2. Grout Color: As selected by Architect.
- B. Water-Cleanable High Performance Epoxy Grout: ANSI A118.3, with a working time not less than 80 minutes, equipped with anti-microbial technology and a full cure time of 14 days at 70 degrees F, and with a VOC

content of 65 g/L or less.

1. Basis-of-Design Product: MAPEI Corporation, "Keraflex Plus", or comparable product from other manufacturers listed below, meeting specified requirements, submitted to and accepted by Architect prior to bidding.
 - a. Ardex.
 - b. Bostik, Inc.
 - c. Custom Building Products.
 - d. LATICRETE International, Inc., Spectralock PRO Grout
 - e. Mer-Kote Products, Inc.
 - f. Southern Grouts & Mortars, Inc.
 - g. Summitville Tiles, Inc.
 - h. TEC; a subsidiary of H. B. Fuller Company.
2. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 deg. F. and 212 deg. F., respectively, and certified by manufacturer for intended use.
3. Grout Color: As selected by Architect.

2.8 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Rapid Set Pre-Tiling Mortar: mortar shall be designed for both interior and exterior use and shall be non-sag type.
 1. Basis-of-Design Product: Ardex; "AM 100 Rapid Set" or comparable product submitted to and accepted by Architect prior to bidding.
 2. Locations for Use: Provide as a ¼ inch thick leveling mortar over interior concrete unit masonry walls indicated to receive tile.
- C. Metal Edge Strips (093000.A04): Profile as specified below, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring and wall applications; white zinc alloy or Type 316 L stainless-steel, ASTM A 666, 300 Series exposed-edge material. Provide Schluter profiles as follows:
 1. TypeTR1: Schluter; "Reno-V", satin anodized aluminum with variable transition from tile to epoxy cove base.
 2. Type TR2: Schluter; "Quadec" satin anodized aluminum straight-edge profile for outside corner trim profile at all outside wall corners of wall tile and at all top cap of wall tile.
 3. TypeTR3: Schluter; "Dilex-AHKA", satin anodized aluminum for transition from wall tile to non-tile floor.
 4. TypeTR4: Schluter; "Jolly" satin anodized aluminum straight-edge profile for curved tile edges.
- D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- E. Grout Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.

2.9 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 - c. Verify that protruding edges of concrete masonry units have been ground smooth and flush with plane of wall.
 - 3. 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.
 - 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.
- C. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, pre-coat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 TILE INSTALLATION

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone 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.
 - 1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:
 - a. Tile floors in wet areas.
 - b. Tile floors consisting of tiles 8 by 8 inches or larger.
 - c. Tile floors consisting of rib-backed tiles.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Jointing Pattern: Lay tile in stacked grid pattern, unless otherwise indicated. Lay tile in a straight stacked pattern unless indicated otherwise on Drawings. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- E. Joint Widths: Unless otherwise indicated, install tile with joint widths as recommended by the manufacturer.
- F. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
1. Terminate top of wainscot decorative metal edge trim.
- G. All tile terminations that do not end in a corner will be capped with a metal edge trim.
- H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
- I. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.
- J. Grout Sealer: Apply grout sealer to cementitious grout joints in the wainscot 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.

3.4 WATERPROOFING INSTALLATION

- A. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.
1. Allow waterproofing to cure and verify by testing that it is watertight before installing tile or setting materials over it.

3.5 CRACK ISOLATION MEMBRANE INSTALLATION

- A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.
1. Allow crack isolation membrane to cure before installing tile or setting materials over it.

3.6 ADJUSTING AND CLEANING

- A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.
- B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
1. Remove grout residue from tile as soon as possible.
 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
 3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.

3.7 PROTECTION

- A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed

tile walls and floors.

1. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

B. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.8 INTERIOR TILE INSTALLATION SCHEDULE

A. Interior Wall Installations (except wet walls), Masonry or Concrete:

1. Tile Installation: Thin-set mortar; TCNA W202I-18., or LHT mortar on cementitious backer unit; TCNA W202I-18.
 - a. Thin-Set Mortar: Latex-portland cement mortar.
 - b. Grout: High performance grout.

B. Interior Wall Installation (Wet Walls), Masonry or Concrete:

1. Tile Installation: Thin-set mortar; TCNA W202I-18., or LHT mortar on cementitious backer unit; TCNA W202I-18.
 - a. Thin-Set Mortar: Latex-portland cement mortar.
 - b. Grout: Water-cleanable epoxy grout.

C. Interior Wall Installations (except wet walls), Metal Studs or Furring:

1. Tile Installation: Thin-set mortar; TCNA W202I-18., or LHT mortar on cementitious backer unit; TCNA W202I-18.
 - a. Thin-Set Mortar: Latex-portland cement mortar.
 - b. Grout: High performance grout.

D. Interior Wall Installations (Wet Walls), Metal Studs or Furring:

1. Tile Installation: Thin-set mortar; TCNA W202I-18., or LHT mortar on cementitious backer unit; TCNA W202I-18.
 - a. Thin-Set Mortar: Latex-portland cement mortar over liquid waterproofing.
 - b. Grout: Water-cleanable epoxy grout.

END OF SECTION 093000

This page intentionally left blank

SECTION 095113 - ACOUSTICAL PANEL CEILINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Acoustical ceiling panels (095113.A01).
 - 2. Ceiling suspension systems (095113.A02).
 - 3. Edge Molding and Trim (095113.A03).
- B. Related Requirements:
 - 1. Section 012300, "Alternates" for alternates effecting work of this section.
 - 2. Division 26 Sections for electrical requirements.

1.2 PRE-INSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.
- C. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
 - 1. Acoustical Panel: One 6 inch square Sample of each type, color, pattern, and texture.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Suspended ceiling components.
 - 2. Structural members to which suspension systems will be attached.
 - 3. Size and location of initial access modules for acoustical panels.
 - 4. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Access panels.
 - 5. Perimeter moldings.
- B. Installer Qualifications: Submit written certification of compliance with requirements.
- C. Qualification Data: For testing agency.
- D. Evaluation Reports: For each acoustical panel ceiling suspension system, from ICC-ES.
- E. Product test reports.
- F. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Acoustical Ceiling Panels: Furnish two, unopened boxes of each type installed.
 - 2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.
 - 3. Hold-Down Clips: Equal to 2 percent of quantity installed.
 - 4. Impact Clips: Equal to 2 percent of quantity installed.
 - 5. Single Tee Adapter Clips: Equal to 2 percent of quantity installed.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Firm with not less than three years of successful experience in installation of acoustical ceilings similar to requirements for this project and which is acceptable to manufacturer of acoustical units, as shown by current written statement from manufacturer.
- B. Pre-installation Conference: Conduct conference at Project site to comply with requirements of Section 01 31 00.
- C. Testing Agency Qualifications: Qualified according to NVLAP.

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 a stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.9 FIELD 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. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Ceiling products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- 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: 50 or less.

2.2 ACOUSTICAL PANEL CEILINGS, GENERAL

- A. Source Limitations:
 1. Acoustical Ceiling Panel: Obtain each type from single source from single manufacturer.
 2. Suspension System: Obtain each type from single source from single manufacturer.
- B. Glass-Fiber-Based Panels: Made with binder containing no urea formaldehyde.
- C. 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 reflectances unless otherwise indicated.
 1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface according to ASTM E 795.
- D. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.
 1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.
- E. Metal Suspension System Standard: Comply with ASTM C 635.

2.3 ACOUSTICAL PANELS (095113.A01)

- A. Recycled Content for Acoustical Panels: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product specified hereinafter or comparable product, meeting specified requirements, by one of the following:
 1. Acoustical Ceiling Units:
 - a. Armstrong World Industries, Inc.
 - b. Certainteed, Saint-Gobain.
 - c. USG Interiors, Inc.; Subsidiary of USG Corporation.
 2. Metal Suspension Systems, Edge Moldings and Decorative Edge Trim:
 - a. Armstrong World Industries, Inc.
 - b. Certainteed, Saint-Gobain.
 - c. Chicago Metallic Corporation.
 - d. Gordon, Inc.
 - e. USG Interiors, Inc.; Subsidiary of USG Corporation.
- C. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as specified.
- D. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

2.4 ACOUSTICAL CEILING PANELS

- A. Acoustical Ceiling Panels, (095113.A01 – **CLG1**): Provide humidity resistant, square lay-in, mineral fiber ceiling panels with the following characteristics:
 1. ASTM E 1264 Classification: Type III, Form 2, Pattern C, E.
 2. Sizes: 24 inch by 48 inch by 5/8 inch
 3. Color: Refer to Material Finish Legend.
 4. Average light reflectance (LR): 0.83,
 5. Noise reduction coefficient (NRC): 0.55.
 6. Ceiling attenuation class (CAC): 35.

7. Articulation class (AC): N/A
 8. Flame Spread/Fire Resistance: Class A.
 9. Humidity Resistance: N/A.
 10. Product warranty: 30 years.
 11. Suspension System: 15/16.
 12. Basis of Design Product: Provide USG; "Radar Basic Panel #2310".
- B. Acoustical Ceiling Panels, (095113.A01 – **CLG2**): Provide humidity resistant, square lay-in, mineral fiber ceiling panels with the following characteristics:
1. ASTM E 1264 Classification: Type IX, Form 2, Pattern G.
 2. Sizes: 24 inch by 48 inch by 5/8 inch
 3. Color: Refer to Material Finish Legend.
 4. Average light reflectance (LR): 0.90,
 5. Noise reduction coefficient (NRC): N/A.
 6. Ceiling attenuation class (CAC): 35.
 7. Articulation class (AC): N/A
 8. Flame Spread/Fire Resistance: Class A.
 9. Humidity Resistance: ClimaPlus.
 10. Product warranty: 30 years.
 11. Suspension System: 15/16.
 12. Basis of Design Product: Provide USG; "Kitchen Lay-In Panel No. 3410".
- C. Acoustical Ceiling Panel, (095113.A01 – **CLG3**): Provide fine textured, square edge lay-in, mineral fiber ceiling panels with the following characteristics:
1. ASTM E 1264 Classification: Type IV, Form 2, Pattern E.
 2. Sizes: 24 inch by 48 inch by 1 inch
 3. Color: Custom color match to P2. Refer to Material Finish Legend.
 4. Average light reflectance (LR): 0.85.
 5. Noise reduction coefficient (NRC): 0.80, minimum.
 6. Ceiling attenuation class (CAC): 38.
 7. Articulation class (AC): 170.
 8. Flame Spread/Fire Resistance: Class A.
 9. Humidity Resistance: HumiGuard+ or comparable from other listed manufacturers.
 10. Product warranty: 30 years.
 11. Suspension grid type: Armstrong Clean Room 15/16.
 - a. Color: Custom color match to P2. Refer to Material Finish Legend.
 12. Basis of Design Product: Provide Armstrong "Calla Health Zone", #2233, or comparable products from manufacturers listed in Article 2.3 of this Section.

2.5 METAL SUSPENSION SYSTEMS, GENERAL

- A. Recycled Content for Suspension Grid: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 60 percent.
- B. 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.
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 the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing according to ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
 - a. Type: Post-installed expansion anchors.
 - b. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.
 2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching 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 according to ASTM E 1190, conducted by a qualified testing and inspecting agency.

- D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - 2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, provide not less than 0.106-inch-diameter wire.
- E. Hanger Rods and Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.
- F. Hold-Down Clips for Non-Fire-Resistance-Rated Ceilings: For vestibule and corridor ceilings adjacent to exterior doors, provide hold-down clips spaced 2'-0" o.c. on all cross-tees for a radius of 10 feet from center of door.
- G. Impact Clips: In all toilet provide manufacturer's standard impact clip system design to absorb impact forces against lay-in panels.
- H. Hemmed Edge Molding: Provide prefinished edge molding of profiles indicated. Finish to match adjacent suspension grid.
- I. Fixture Trim: Provide manufacturer's standard fixture trim for fixtures within the 4 by 4 ceiling panels.
 - 1. Color to match suspension trim.

2.6 METAL SUSPENSION SYSTEM (095113.A02)

- A. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; pre-painted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 coating designation; with prefinished 15/16-inch- wide metal caps on flanges.
 - 1. Structural Classification: Intermediate-duty system.
 - 2. End Condition of Cross Runners: Override (stepped) or butt-edge type.
 - 3. Face Design: Flat, flush.
 - 4. Cap Material: Steel cold-rolled sheet, except in kitchen and food preparation areas provide aluminum.
 - 5. Cap Finish: As indicated on Material Finish Legend.
 - 6. Basis of Design:
 - a. Armstong "Prelude XL"
 - b. Profile: USG "DX/DXL" as indicated on Material Finish Legend.
- B. Narrow-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 coating designation; with prefinished 9/16-inch- wide metal caps on flanges.
 - 1. Structural Classification: Intermediate-duty system.
 - 2. End Condition of Cross Runners: Override (stepped) or butt-edge type.
 - 3. Face Design: Flat, flush.
 - 4. Cap Material: Steel cold-rolled sheet, except in kitchen and food preparation areas provide aluminum.
 - 5. Cap Finish: As indicated on Material Finish Legend.
 - 6. Basis of Design: Armstong "Prelude XL"
 - 7. Use Fire Rated suspension system where required for use with Fire Rated Ceiling Panel.

2.7 METAL EDGE MOLDINGS AND TRIM (095113.A03)

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

- B. Basis of Design Product of Transition Molding: Subject to compliance with requirements provide Armstrong "Acoustical and Drywall Transition Molding".
 - 1. Product number: 7911 - Shadow Reveal Transition Molding, 9/16" Shadow Reveal Transition Molding.
 - a. 3/8 x 1/4" shadow reveal with 9/16" horizontal flange.
 - 2. Product number: 7912 - Shadow Reveal Transition Molding, 15/16" Shadow Reveal Transition Molding.
 - a. 3/8 x 1/4" shadow reveal with 15/16" horizontal flange.
- C. Basis of Design Product of Transition Molding: Subject to compliance with requirements provide "DONN Brand SL DXT" by USG Interiors, Inc.; Subsidiary of USG Corporation No Substitutions Allowed.
 - 1. Product number: CPDWA9120.
 - a. Reveal: 3/8" x 3/8".

2.8 ACOUSTICAL SEALANT

- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Acoustical Sealant for Concealed Joints:
 - a. Henkel Corporation; OSI Pro-Series SC-175 Acoustical Sound Sealant.
 - b. Pecora Corporation; AIS-919.
 - c. Tremco, Inc.; Tremco Acoustical Sealant.
- B. Acoustical Sealant: Manufacturer's standard sealant complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
 - 1. Concealed Joints: Nondrying, non-hardening, non-skinning, non-staining, gunnable, synthetic-rubber sealant.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. 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.

3.3 INSTALLATION

- A. General: Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and Cisca's "Ceiling Systems Handbook."
 - 1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.

2. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
 6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, post-installed mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 8. Do not attach hangers to steel deck tabs.
 9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
 11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- 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.
1. Arrange directionally patterned acoustical panels as indicated on reflected ceiling plans.
- D. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or post-installed anchors.
- E. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
1. At areas indicated, 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 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
 3. Do not use exposed fasteners, including pop rivets, on moldings and trim, unless acceptable to Architect.
- F. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- G. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
1. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
 2. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
 3. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
 4. Hold-Down Clips for Non-Fire-Resistance-Rated Ceilings: For vestibule ceilings adjacent to exterior doors, provide hold-down clips spaced 2'-0" o.c. on all cross-tees for a radius of 10 feet from center of door.
 5. Impact Clips: In all toilet and locker rooms, provide manufacturer's standard impact clip system design to absorb impact forces against lay-in panels.

3.4 INSTALLATION OF DIRECTLY ATTACHED ACOUSTICAL CEILINGS

- A. Adhesive Installation: Install acoustical panels by bonding to substrate, using adhesive and procedure recommended in writing by panel manufacturer and as follows:
1. Wipe and prime ceiling.
 2. Remove loose dust from backs of panels by brushing.
 3. Install splines in joints between tiles and maintain bottom surface to a uniform level. Shim tile or correct substrate as required to maintain levelness.
 4. Maintain tight butt joints, aligned in both directions and coordinated with ceiling fixtures.

3.5 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.

END OF SECTION 095113

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Resilient base (096513.A01).
 - 2. Resilient stair treads (096513.A02).
 - 3. Anti-slip Safety Track.
 - 4. Metal transition strips.
- B. Related Requirements:
 - 1. Section 012300 "Alternates" for alternates effecting work of this section.
 - 2. Section 033000 "Cast-in-Place Concrete."

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Initial Selection: For each type of product indicated.
- C. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturers' standard-size Samples, but not less than 12 inches long.

1.3 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.4 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 manufacturer, but not less than 50 deg F or more than 90 deg F.

1.5 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 65 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 THERMOSET-RUBBER BASE (096513.A01)

- A. Basis-of-Design Product - **Type RB1**: Subject to compliance with requirements, Tarkett: "Baseworks Wall Base" or comparable product from one of the following:
 - 1. Johnsonite Corporation.
 - 2. Kentile.
 - 3. Mercer Plastics Co, Inc.
 - 4. R.C. Musson Rubber Co.
 - 5. Roppe.
- B. Product Standard: ASTM F 1861, Type TS (rubber, thermoset).
 - 1. Group: 1 (solid, homogeneous).
 - 2. Style: As indicated on Material Finish Legend.
- C. Product Characteristics:
 - 1. Thickness: 0.125 inch.
 - 2. Height: 4 inches as indicated on Drawings.
 - a. Type "TSB-XX": 4 inches as indicated on Drawings.
 - 3. Lengths: Coils in manufacturer's standard length.
 - 4. Outside Corners: Pre-formed.
 - 5. Inside Corners: Job formed.
 - 6. Colors: As indicated by manufacturer's designations on the Material Finish Legend.
- D. Match Existing Wall Base - **Type RB2**: Field match existing wall base (if required and no attic stock is available) with Baseworks. Vendor to field match with Architect.

2.3 RESILIENT STAIR TREAD

- A. Resilient Stair Treads (096513.A02): ASTM F2169.
 - 1. Type: TS.
 - 2. Class: 2.
 - 3. Group: 1 (embedded abrasive strips).
 - 4. Nosing Style: Round
 - 5. Nosing Height: 1-1/2 inches (38 mm)
 - 6. Thickness: 1/4 inch (6 mm) and tapered to back edge .
 - 7. Size: Lengths and depths to fit each stair tread in one piece[one piece or, for treads exceeding maximum lengths manufactured, in equal-length units].

2.4 ANTI-SLIP SAFETY TRACK

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Gradus "Safety Track" or comparable product submitted to and accepted by Architect prior to bidding.
- B. Product Characteristics:
 - 1. Slip-resistant surface finish consisting of a silicone carbide resin carrier with a self-adhesive backing.
 - 2. Roll Size: 2 inch by 60 feet cut to sizes indicated on Drawings.
 - 3. Color: Black
- C. Installation: Prepare surface to be clean, even and free from oil, moisture or dust. Prime surface as recommended by manufacturer with Anti-slip Primer for Safety Track.

2.5 METAL TRANSITION STRIPS

- A. Metal Transition Strips: Refer to details on drawings and Sheet A681 for manufacturers and types.
- B. ADA compliant. Maximum slope 1:2.
- C. Locations: Provide molding accessories and transitions in areas indicated.
- D. Colors and Patterns: As selected by Architect from manufacturer's full range.

2.6 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and suitable for substrate conditions indicated.
 - 1. Adhesives shall have a VOC content of 50 g/L or less.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum 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.
 - 1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

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

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Job-Formed Corners:
 - 1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
 - a. Form without producing discoloration (whitening) at bends.
 - 2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
 - a. Miter or cope corners to minimize open joints.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 METAL TRANSITION STRIP INSTALLATION

- A. Install metal transition strips where indicated. Securely anchor in place with mechanical fasteners as recommended by transition strip manufacturer.

3.6 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum horizontal surfaces thoroughly.
 - 3. Damp-mop horizontal surfaces to remove marks and soil.
- C. Protect resilient products from marks, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

SECTION 096519 - RESILIENT TILE FLOORING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes resilient tile flooring (096519.A01) of the following types:
 - 1. Vinyl composition tile.
 - 2. Luxury vinyl floor tile.
 - 3. Solid vinyl floor tile.
- B. Related Sections:
 - 1. Section 012200 "Unit Prices" for unit prices effecting work of this Section.
 - 2. Section 012300 "Alternates" for alternates effecting work of this Section.
 - 3. Section 033000 "Cast-in-Place Concrete" for integral moisture vapor sealing admixture.
 - 4. Section 096513 "Resilient Base and Accessories" for related base and floor transitions.
 - 5. Section 096813 "Tile Carpeting" for related flooring.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 - 1. Floor patterns and transition strip locations.
 - 2. Layout, colors, widths, and dimensions of game lines and markers.
 - 3. Seam locations for sheet flooring.
- C. Samples for Verification: Samples: For each exposed product and for each color and texture specified in manufacturer's standard size, but not less than 6-by-9-inch sections.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data:
 - 1. For qualified flooring Installer.
 - 2. For qualified flooring manufacturer.
- B. Preparation and Installation Guidelines: For each type of resilient flooring, including current subfloor preparation guidelines in addition to installation guidelines published by flooring manufacturer.
- C. Slab Moisture Testing Results: Refer to Part 3 of this Section.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of floor tile to include in maintenance manuals.
- B. Warranty:
 - 1. Manufacturer material warranty.
 - 2. Installer installation warranty.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Tile: Furnish one un-opened box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. ISO 9001 Certified.
 - 2. ISO 14001 Certified.
 - 3. At least ten years active experience in the manufacture and marketing of indoor resilient flooring.
 - 4. A provider of authorized installer training.
 - 5. Must be competent in techniques required by manufacturer for resilient flooring installation indicated.
- B. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.
 - 1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required and shall have at least five years' experience.
- C. Mockups/Field Samples: Build mockups/field samples to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockups/field samples for floor tile including resilient base and accessories.
 - a. Size: Minimum 50 sq. ft. for each type, color, and pattern in locations directed by Architect.
 - 2. Approval of mockups/field samples does not constitute approval of deviations from the Contract Documents contained in mockups/field samples unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- D. Fire Test Characteristics: As determined by testing identical products according to ASTM E 648, Class 1, by a qualified testing agency acceptable to authorities having jurisdiction.

1.7 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 floor tile 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 or more than 90 deg F. Store floor tiles on flat surfaces.

1.8 FIELD CONDITIONS

- A. Maintain temperatures during installation within range recommended in writing by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive flooring 48 hours before installation, during installation, and 48 hours after installation unless longer period is recommended in writing by manufacturer.
 - 1. After post-installation period, maintain temperatures within range recommended in writing by manufacturer, but not less than 55 deg F or more than 95 deg F.
 - 2. Close spaces to traffic during flooring installation.
 - 3. Close spaces to traffic for 48 hours after flooring installation unless manufacturer recommends longer period in writing.
- B. Install floor tile after other finishing operations, including painting, have been completed.

1.9 WARRANTY

- A. Special Limited Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace resilient flooring that fails within specified warranty period.
 - 1. Material warranty direct from the product manufacture and not a separate or third party insurance provider.
 - 2. Failures include, but are not limited to, the following
 - a. Material manufacturing defects.
 - b. Surface wear and deterioration to the point of wear-through.

- c. Failure due to substrate moisture exposure not exceeding 5 pounds moisture vapor emission rate when tested according to ASTM F 1869, and 80 percent relative humidity when tested according to ASTM F 2170.
 - 3. Warranty Period:
 - a. For materials: 2 years from date of Substantial Completion.
 - b. For surface wear: 15 years from date of Substantial Completion.
- B. Special Limited Warranty: Installer's standard form in which installer agrees to repair or replace sports flooring that fails due to poor workmanship or faulty installation within the specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 VINYL COMPOSITION FLOOR TILE (096519.A01 - **RF4**)

- A. Basis of Design Product: Subject to compliance with requirements, provide.; Armstrong World Industries, Inc. "Standard Excelon" Imperial Texture or comparable product meeting specified requirements and color indicated from one of the following:
 - 1. Acceptable Manufacturers:
 - a. Congoleum Corporation.
 - b. Mannington Mills, Inc.
 - c. Tarkett/Azrock.
- B. Tile Standard: ASTM F1066.
 - 1. Class: Class 2 (through pattern).
- C. Product Characteristics:
 - 1. Overall/ Wear Layer Thickness: 1/8 inch.
 - 2. Wearing Surface: Smooth.
 - 3. Factory Finish: Fast Start.
 - 4. Size: 12 by 12 inches.
 - 5. Edges: Square edged (SE).
 - 6. Static Load Resistance at 125 psi: ≤ 0.005 inch per ASTM F970.
 - 7. Colors and Patterns: Intent is to match existing. Verify color in field with Architect.

2.3 LUXURY VINYL FLOOR TILE (096519.A0 - **RF5**)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Treeline, I721V" by Patcraft Commercial Carpet and Commercial Flooring. Comparable products from other manufacturers will be considered, which match color and pattern selected to Architect's satisfaction and, are submitted to and accepted by Architect prior to bidding.
 - 1. Tile Standard: ASTM F 1700.
 - a. Class: Class III, printed film vinyl tile.
 - 2. Product Characteristics:
 - a. Overall Thickness: 5 mm.
 - 1) Wear layer thickness 20 mil.
 - b. Size: 7 inches by 48 inches.
 - 3. Performance Characteristics:
 - a. Static Load Limit: Passes, modified at 1,500 psi when tested according to ASTM F 970.
 - 4. Installation: Full adhesive as recommended by manufacturer.

2.4 SOLID VINYL FLOOR TILE (096519.A01 – **RF1, RF2, RF3**)

- 1) Wear layer thickness 0.020 inch, nominal.
- B. Basis-of-Design Product: Subject to compliance with requirements, provide Patcraft; "Admix 36x36", Style Number: I347V. Comparable products from other manufacturers will be considered, which match color and pattern selected to Architect's satisfaction and, are submitted to and accepted by Architect prior to bidding.
 1. Tile Standard: ASTM F 1700.
 - a. Class: Class I, monolithic solid vinyl tile Type A (smooth).
 - b. Type: A, smooth surface.
 2. Product Characteristics:
 - a. Thickness: 0.126 inch.
 - b. Size: 36 inches by 36 inches.
 3. Performance Characteristics:
 - a. Static Load Limit: Not less than 250 psi when tested according to ASTM F 970.
 4. Colors and Patterns: As indicated by manufacturer's designations on Material Color Schedule.
 5. Installation: Quarter Turn

2.5 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient sheet flooring manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by tile flooring and adhesive manufacturers for each type of tile flooring. Adhesive shall be suitable for substrate conditions involved and compatible with flooring.
 1. Adhesives 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."
- C. Floor Polish: For vinyl composition tile, provide protective liquid floor polish products as recommended by manufacturer.
- D. LVT with Quick Stick pre-applied adhesive – 99% R.H., MVER 18, pH12.
- E. Topical Concrete Vapor Sealer: Liquid penetrating type or film-forming type, designed to seal concrete and inhibit moisture transmission through slab. Concrete vapor sealers shall be as recommended by resilient tile flooring contractor based upon successful previous installations and as acceptable to resilient tile flooring manufacturer. Refer to Section 012200 "Unit Prices".
- F. Metal Transition Strips: Provide pre-manufactured aluminum edging, 3/8 inch high by 2-1/2 inches wide in manufacturer's standard lengths and in longest lengths practical.
 1. Basis-of-Design Product: Gradus; "Model RT247". Comparable products matching profile and characteristics of specified product will be considered.
 2. Fasteners: Provide post-installed expansion anchors with Type 304 stainless steel countersunk fasteners.
- G. Vinyl Sealer: Provide NuTech VT WB urethane coating for vinyl, LVT and linoleum surfaces on RF1-RF3 in locations indicated on Room Finish Schedule in Drawings. Apply as recommended by manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum 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 floor tile.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by carpet tile manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by carpet tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
 - 4. Moisture Testing (Contractor's Option):
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours, unless a higher rate is accepted by flooring manufacturer in writing.
 - 1) Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than two tests in each installation area and with test areas evenly spaced in installation areas.
 - b. Perform relative humidity test using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 80 percent relative humidity level measurement, unless a higher rate is acceptable to flooring manufacturer.
- C. Concrete Vapor Sealer Application: Prepare surfaces to receive concrete vapor sealer and apply concrete vapor sealer in strict accordance with vapor sealer manufacturer's written instructions to suit slab moisture conditions encountered.
- D. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate according to manufacturer's written instructions.
 - 1. Fill cracks 1/8 inch wide and wider, fill and level holes and depressions 1/4 wide or wider and grind level all protrusions more than 1/32 inch, unless more stringent requirements are required by manufacturer's written instructions.
- E. Do not install floor tiles until they are the same temperature as the space where they are to be installed.
- F. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 - 1. Lay tiles square with room axis, unless specifically indicated otherwise.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.

- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile from marks, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
 - 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.
- D. Cover floor tile until Substantial Completion.

END OF SECTION 096519

SECTION 096723 - RESINOUS FLOORING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes seamless resinous flooring systems (096723.A01) with integral base (096723.A02).
- B. Related Sections:
 - 1. Section 012200 "Unit Prices" for waterproofing membrane.
 - 2. Section 096513 "Resilient Base and Accessories".

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:
 - a. Review delivery, storage, and handling procedures.
 - b. Review ambient conditions and ventilation procedures.
 - c. Review subfloor preparation procedures.
 - d. Review layout and patterns.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include manufacturer's technical data, application instructions, and recommendations for each resinous flooring component required; in addition to the following:
 - 1. List each material and cross-reference the specific coating, finish system and application. Identify each material by manufacturer's catalog number and general classification.
 - 2. Laboratory Test Reports: For resinous flooring systems, documentation indicating that products comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers".
- B. Samples for Verification: Prior to beginning work, submit samples for each resinous flooring system color, texture and sheen required and as follows:
 - 1. Samples shall be 6 inches square, applied to a rigid backing by Installer for this Project.
 - 2. Resubmit samples as requested until required sheen, color and texture is acceptable to Architect.

1.4 INFORMATIONAL SUBMITTALS

- A. Installer Certificates: Submit certificates signed by manufacturer certifying that installers comply with specified requirements, in addition to the following:
 - 1. Submit substantiating evidence of experience installing the specific brand of products proposed in similar areas, in addition to meeting Installer Qualification criteria.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For resinous flooring to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an Installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated. Installer shall be/have been trained by flooring system manufacturer with experience in application and installation of systems similar in complexity to those required for this project, in addition to the following:

1. Installer shall have a minimum of two (2) years continuous experience under the current company name.
 2. Installer shall submit a reference list of at least three (3) projects, similar in size and applied system(s), completed in the states of Missouri. Include contact information for General Contractor or Construction Manager and Owner. List types and names of systems installed, each material/component of system(s) installed, quantity installed and dates completed.
- B. Mockups/Field Samples: Build mockups/field samples to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Build mockups/field samples in conjunction with the wall tile mock-up installation. Mockup/field sample shall extend to floor to demonstrate transition from wall to floor.
 2. Approved mockups/field samples may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components. Include handling instructions and precautions.
- B. Store materials not in actual use in tightly covered containers at a minimum ambient temperature of 45 deg F in a well-ventilated area. Maintain containers in clean condition, free from foreign material and residue.
1. Protect liquid components from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary precautionary measures to ensure workmen and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing and application of floor systems.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.
1. Do not commence work until the building can be maintained at a temperature range between 60 deg F and 90 deg F for 48 hours before, during and 48 hours after application. Broom clean areas (reasonably dust free) and have adequate controlled ventilation.
 2. Maintain ventilation in each area indicated to receive resinous flooring until completion of the resinous flooring work in that area.
- B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.
- C. Close spaces to traffic during resinous flooring application and for 24 hours after application unless manufacturer recommends a longer period.
- D. Surfaces to receive resinous flooring must be acceptable and in accordance with flooring system manufacturer's recommendations.
1. Provide clean, dry, and neutral substrate for resinous flooring application.
 2. Notify Owner's Representative in writing of unsuitable surfaces and conditions. Commencement of work implies acceptance of surfaces and working conditions.

1.9 PROTECTION

- A. Protect adjacent surfaces from damage resulting from work of this trade. If necessary, mask and/or cover adjacent surfaces, fixtures, cabinetry, equipment, etc. by suitable means.
- B. Post "NO SMOKING" signs while work is in progress and during curing.

1.10 SPECIAL WARRANTY

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Low-Emitting Materials: Flooring system shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Flammability: Self-extinguishing according to ASTM D 635.
- C. Slip Resistance: Resinous flooring surfaces shall have the following minimum performance requirements as indicated below.
 - 1. Static Dry Coefficient of Friction: 0.6 minimum per ASTM D2047.
 - 2. Dynamic Wet Coefficient of Friction: 0.45 minimum per ANSI A326.3 or ANSI B101.3.

2.2 MANUFACTURERS

- A. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, body coats, and topcoats, from single source from single manufacturer to ensure material compatibility, chemical and mechanical bond; quality of materials, color and pattern consistency. Obtain secondary materials, including patching and fill material, color chips/flakes and granules, joint sealant, and repair materials, of type and from manufacturer recommended in writing by manufacturer of primary materials.

2.3 RESINOUS FLOORING (096723.A01 – ***FT1, FT2***)

- A. Basis-of-Design Product: Subject to compliance with specified requirements, provide DESCO Coatings, Inc; "Cremona TG" with aliphatic urethane topcoat, resinous flooring system or one of the resinous flooring systems listed below.
 - 1. Dur-A-Flex; "DUR-A-Quartz Q11" with aliphatic urethane topcoat.
 - 2. Stonhard; "Stonetec ERF" with aliphatic urethane topcoat.
 - 3. Sherwin-Williams Resuflor Quartz TQ with aliphatic urethane topcoat.
 - 4. Tnemec; Series 223 "DECO-Trowel" with aliphatic urethane topcoat.
 - 5. Comparable products from manufacturers listed below and other manufacturers which meet or exceed specified requirements will also be considered when submitted to and accepted by Architect as a substitution prior to bidding only.
- B. Resinous Flooring System: System shall be a trowel-applied, abrasion-, UV-, impact-, and chemical-resistant, aggregate-filled, and resin-based monolithic floor surfacing designed to produce a seamless floor and integral cove base. System shall be capable of being applied over an existing epoxy resinous floor.
- C. System Characteristics:
 - 1. Color and Patterns: As noted on Material Finish Schedule.
 - 2. Wearing Surface: Orange-peel texture to match approved sample.
 - a. Slip resistance shall not be less than performance requirements indicated in this Section.
 - 3. Overall System Thickness: Not less than 3/16 inch.
- D. Primer: Provide manufacturer's recommended primer to suit substrate and resinous flooring system indicated.
 - 1. Formulation Description: 100 percent solids.
- E. Body Coats:
 - 1. Resin: Epoxy.
 - 2. Formulation Description: 100 percent solids.
 - 3. Type: Clear or colored to suit design mix selected.
 - 4. Application Method: Self-leveling slurry with broadcast aggregates.

5. Aggregates: Colored quartz (ceramic-coated silica).
 - a. Quartz aggregate shall be Grade 11.
- F. Topcoats: Sealing or finish coats.
 1. Resin: Aliphatic Urethane.
 2. Formulation Description: High solids.
 3. Type: Clear.
 4. Number of Coats: As required to achieve overall system thickness specified and texture selected.
 5. Finish Texture and Sheen: Match sample approved by Owner's Representative.
- G. Integral Cove Base: Provide integral coved base of height indicated with 1 inch radiused cove and bullnosed top edge termination. Provide keyed joint where resinous flooring terminates with other materials.
- H. System Physical Properties: Provide resinous flooring system with the following minimum physical property requirements when tested according to test methods indicated:
 1. Compressive Strength (Binder): 14,000 psi minimum according to ASTM D 695.
 2. Compressive Strength (System): 10,000 psi minimum according to ASTM C 579.
 3. Tensile Strength: 2,250 psi minimum according to ASTM C 307.
 4. Bond Strength: 400 psi minimum according to ASTM D 4541.
 5. Water Absorption: 0.04 percent maximum according to ASTM D 570.
 6. Impact Resistance: No chipping, cracking, or delamination and not more than 1/16-inch permanent indentation according to MIL-D-3134J.
 7. Resistance to Elevated Temperature: No slip or flow of more than 1/16 inch according to MIL-D-3134J.
 8. Abrasion Resistance: 80 mg maximum weight loss according to ASTM D 4060.
 9. Hardness: 75-80 Shore D according to ASTM D 2240.
 10. Flame Spread/NFPA 101: Class A according to ASTM E 84.
- I. System Chemical Resistance: Test specimens of cured resinous flooring system are unaffected when tested according to ASTM D 1308 for 50 percent immersion in the following reagents for no fewer than seven days:
 1. Bleach (3%).
 2. Coffee.
 3. Hydro peroxide (3%).
 4. Nitric acid (10%).
 5. Phosphoric acid (20%).
 6. Sodium hydrate (40%).
 7. Urine.

2.4 ACCESSORIES

- A. Reinforcing Membrane: Flexible resin formulation that is recommended by resinous flooring manufacturer for substrate and resinous flooring system indicated and that inhibits substrate cracks from reflecting through resinous flooring.
 1. Formulation Description: Manufacturer's standard high solids.
 - a. Provide fiberglass scrim embedded in reinforcing membrane.
- B. Metal Transition Strips: Provide pre-manufactured aluminum edging, 1/8 inch high by 2 inches wide in manufacturer's standard lengths and in longest lengths practical.
 1. Basis-of-Design Product: National Guard Products; Model 8132 "Heavy Duty Aluminum Transition Strip". Comparable products matching profile and characteristics of specified product will be considered.
 2. Fasteners: Provide post-installed expansion anchors with Type 304 stainless steel countersunk fasteners.
 - a. Provide all fasteners and accessories necessary for secure and proper installation.
- C. Transition Strip: Provide pre-manufactured two-piece edging.
 1. Basis-of-Design: Product: Gradus "TT35/AFT15". Comparable products matching profile and characteristics of specified product, or as indicated on Sheet A681 will be considered.
 - a. Material: PVC-u top and aluminum base.
 - b. Overall Height: 10 mm.
 - c. Width: Top - 35 mm, base - 16 mm.
 - d. Color: As selected from manufacturers full range.
 - e. Fasteners: Provide post-installed expansion anchors with Type 304 stainless steel countersunk fasteners.
 - 1) Provide all fasteners and accessories necessary for secure and proper installation.

- D. At top of resinous wall base provide the following product. Colors shall match existing at project site as determined by Architect. Height of trim shall match thickness of resinous flooring system.
 - 1. Basis of Design Product: "Jolly" by Schluter.
- E. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated.
- F. Joint Sealant: Type recommended or produced by manufacturer of resinous flooring system for type of service and joint condition indicated.
- G. Waterproofing Membrane: When required by manufacturer for a successful installation over project site conditions, provide and install a fluid applied moisture barrier membrane, to prevent excessive moisture/humidity conditions, allowing a fully warranted floor installation.
 - 1. Vapor barrier to allow 100% relative humidity at the floor surface, while maintaining the manufacturer's full warranty.
 - 2. Refer to Section 012200 "Unit Prices".

PART 3 EXECUTION

3.1 EXAMINATION

- A. Contractor shall examine subfloor surfaces to verify all substrates and conditions are satisfactory. A satisfactory subfloor surface is defined as one that is smooth and free from cracks, holes, ridges, curing compounds, and other adhesives and coatings that may inhibit bonding capability of resinous flooring and primer, as well as other defects that may impair performance and appearance.

3.2 PREPARATION

- A. Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry substrate for resinous flooring application.
 - 1. Areas where flooring is existing, must be cleaned to remove all floor material, adhesives, grease or any residue that may interfere with interfacial adhesion between substrate and new resinous flooring system.
 - 2. Prepare concrete substrates by shot blasting or grinding to achieve surface profile recommended by resinous flooring manufacturer.
- B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, adhesives, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.
 - 1. Roughen concrete substrates as follows:
 - a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
 - b. Comply with ASTM C 811 requirements unless manufacturer's written instructions are more stringent.
 - 2. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written instructions.
 - 3. Moisture testing is not required. However, Contractors at their own expense may, as they deem necessary, verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.
 - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with application of resinous flooring only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. of slab area in 24 hours.
 - b. Relative Humidity Test: Use in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 80 percent relative humidity level measurement.
 - 4. Alkalinity and Adhesion Testing: Verify that concrete substrates have pH within acceptable range. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.
- C. Patching and Filling: Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.
 - 1. Control Joint Treatment: Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written instructions.

- D. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.
- E. Metal Transition Strips: Install at locations indicated and between resinous flooring and concrete. Transition strip may be used as a screed. Thicken resinous flooring application as necessary so flooring is flush with top of transition strip. Installation shall be in strict accordance with edging manufacturer's written recommendations.

3.3 APPLICATION

- A. Proceed with resinous flooring work after subfloor surfaces are satisfactory. Commencement of resinous flooring work is construed as Installer's acceptance of substrate surfaces within a particular area.
 - 1. Coordinate work within this section with adjacent finish work to achieve full coverage of each finish as required by each section.
- B. Apply components of resinous flooring system according to manufacturer's latest written instructions, employing technically-trained, approved mechanics, to produce a uniform, monolithic wearing surface of thickness indicated.
 - 1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
 - 2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
 - 3. Expansion and Isolation Joint Treatment: At substrate expansion and isolation joints, comply with resinous flooring manufacturer's written instructions.
 - a. Do not fill moving isolation joints or expansion joints.
 - b. At movement joints, provide membrane isolation strips and reinforcing tape as recommended by resinous flooring manufacturer.
- C. Primer: Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- D. Reinforcing Membrane: Apply reinforcing membrane to substrate cracks.
 - 1. Fill non-moving control joints with approved elastomeric sealant or full-depth semi-rigid two-component epoxy joint filler, designed specifically for this purpose (use full-depth semi-rigid joint filler when reinforcement of the joint edge is desirable), or two-component epoxy and filler (epoxy to be same material as flooring).
- E. Troweled or Screeded Body Coats: Apply troweled or screeded body coats in thickness indicated for flooring system. Hand or power trowel and grout to fill voids. When body coats are cured, remove trowel marks and roughness using method recommended by manufacturer.
- F. Grout Coat: Apply grout coat, of type recommended by resinous flooring manufacturer, to fill voids in surface of final body coat.
- G. Topcoats: Apply topcoats in number indicated for flooring system and at spreading rates recommended in writing by manufacturer and to produce wearing surface indicated.
- H. Cure resinous flooring in compliance with flooring manufacturer's directions to prevent contamination during all stages of application.
- I. Finish work shall match approved samples; be uniform in thickness, sheen, color and texture; and be free of defects detrimental to appearance and performance.
- J. Install metal transition strips where resinous flooring abuts other flooring materials. Securely anchor in place with mechanical fasteners as recommended by transition strip manufacturer.

3.4 FIELD QUALITY CONTROL

- A. Material Sampling: Owner's Representative may, at any time and any number of times during resinous flooring application, require material samples for testing for compliance with requirements.
 - 1. Owner will engage an independent testing agency to take samples of materials being used. Material samples will be taken, identified, sealed, and certified in presence of Contractor.
 - 2. Testing agency will test samples for compliance with requirements, using applicable referenced testing procedures or, if not referenced, using testing procedures listed in manufacturer's product data.

3. If test results show applied materials do not comply with specified requirements, pay for testing, remove noncomplying materials, prepare surfaces coated with unacceptable materials, and reapply flooring materials to comply with requirements.
- B. Core Sampling: At the direction of Owner's Representative and at locations designated by Owner's Representative, take one core sample per 1000 sq. ft. of resinous flooring, or portion of, to verify thickness. For each sample that fails to comply with requirements, take two additional samples. Repair damage caused by coring. Correct deficiencies in installed flooring as indicated by testing.
- C. Touch-up or repair damaged coatings. Touch-up shall not be visibly different. Recoat entire surface if touch-up results are visible, either in sheen, texture or color.

3.5 CLEANING AND PROTECTION

- A. Clean resinous flooring prior to Substantial Completion. Use materials and procedures recommended by resinous flooring manufacturer.
- B. Protect resinous flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.
 1. Remove any temporary covering prior to cleaning and final inspection.

END OF SECTION 096723

This page intentionally left blank

SECTION 096813 - TILE CARPETING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes modular carpet tile (096813.A01).
- B. Related Requirements:
 - 1. Section 012200 "Unit Prices" for topical moisture mitigation.
 - 2. Section 093000 "Tiling" for metal transition strips.
 - 3. Section 096513 "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

1.2 PRE-INSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:
 - a. Review delivery, storage, and handling procedures.
 - b. Review ambient conditions and ventilation procedures.
 - c. Review subfloor preparation procedures.
 - d. Review carpet tile layout and patterns.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
 - 2. Include installation recommendations for each type of substrate.
- B. Shop Drawings: Show the following:
 - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
 - 2. Type of substrate to receive tile carpeting.
 - 3. Type of installation.
 - 4. Pattern of installation.
 - 5. Pattern type, location, and direction.
 - 6. Carpet tile type, color and dye lot.
 - 7. Type, color and location of insets and borders.
 - 8. Type, color and location of edge, transition, and other accessory strips.
 - 9. Transition details to other flooring materials.
- C. Samples for Verification: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
 - 1. Carpet Tile: Full-size Sample.
- D. Product Schedule: For carpet tile. Use same designations indicated on Drawings.
- E. Sustainable Product Certification: Provide ANSI/NSF 140 certification for carpet products.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
 - 1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 - 2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.6 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. Carpet Tile: Furnish one un-opened box of each carpet tile type, color and pattern for every 5 percent of amount installed.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.
- B. Fire-Test-Response Ratings: Where indicated, provide carpet tile identical to those of assemblies tested for fire response according to NFPA 253 by a qualified testing agency.
- C. Mockups/Field Samples: Build mockups/field samples to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockups/field samples for carpet tile including accessories.
 - a. Size: Minimum 50 sq. ft. for each type, color, and pattern in locations directed by Architect.
 - 2. Approval of mockups/field samples does not constitute approval of deviations from the Contract Documents contained in mockups/field samples unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with the Carpet and Rug Institute's CRI 104.

1.9 FIELD CONDITIONS

- A. Comply with the Carpet and Rug Institute's CRI 104 for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.
- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

1.10 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 2. Failures include, but are not limited to, more than 10 percent edge raveling, snags, runs, dimensional stability, excess static discharge, loss of tuft bind strength, loss of face fiber, and delamination.
 - 3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 CARPET TILE (096813.A01)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products specified on drawings or a comparable products meeting specified requirements, having similar colors and patterns as acceptable to Architect with the following characteristics submitted to and accepted by Architect prior to bidding.
 - 1. Refer to Material Finish Legend for carpet selections including name, manufacturer, and installation pattern.
- B. Carpet Type **C1**: Subject to compliance with requirements, provide "Linear Tension from Organic Interruption Collection" Style Number: I0541 by Patcraft.
 - 1. Product Construction: Multi-Level Pattern Loop.
 - 2. Fiber Type: Solution Q Extreme Nylon.
 - 3. Face Weight: 19 oz/yd².
 - 4. Pile Thickness: 0.225 inches.
 - 5. Pile Density: 8444 oz/yd³.
 - 6. Stitches: 11 per inch.
 - 7. Radiant Panel: ASTM E-648 Class 1.
 - 8. Smoke Density: ASTM E-662 ≤ 450.
 - 9. Primary Backing: Non Woven Synthetic.
 - 10. Soil / Stain Protection: Manufacturer's standard with warranty.
 - 11. Color and Pattern: As indicated on Material Finish Legend.
 - 12. Installation Method: As indicated on Material Finish Legend.
- C. Carpet Type **C2**: Subject to compliance with requirements, provide "Moving from Walk Forward Collection" Style Number: I0536 by Patcraft.
 - 1. Product Construction: Multi-Level Pattern Cut/Loop.
 - 2. Fiber Type: EcoSolution Q100 Nylon.
 - 3. Face Weight: 28 oz/yd².
 - 4. Pile Thickness: 0.279 inches.
 - 5. Pile Density: 9081 oz/yd³.
 - 6. Stitches: 10 per inch.
 - 7. Radiant Panel: ASTM E-648 Class 1.
 - 8. Smoke Density: ASTM E-662 ≤ 450.
 - 9. Primary Backing: Non Woven Synthetic.
 - 10. Soil / Stain Protection: Manufacturer's standard with warranty.
 - 11. Color and Pattern: As indicated on Material Finish Legend.
 - 12. Installation Method: As indicated on Material Finish Legend.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, non-staining, pressure-sensitive type. Select adhesives suitable for substrate conditions and compatible with flooring and backing. Adhesives shall comply with flammability requirements for installed carpet tile and be recommended by carpet tile manufacturer for releasable installation.
 - 1. Adhesives shall have a VOC content of 50 g/L or less.
 - 2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- C. Adhesive Tape: Tile Carpeting manufacturer's recommended adhesive tape to suit backing type and substrates involved. Basis-of-Design Product: "TandusTape."
- D. Resilient Transition Strips: Refer to Section 096513 "Resilient Base and Accessories" and Interior Material Finish Legend for information and products for use at carpet transitions.

- E. Metal Edge/Transition Strips: Extruded aluminum with anodize aluminum finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.
 - 1. For carpet to resinous flooring and carpet to resilient sheet vinyl transitions, provide pre-manufactured transition strips as indicated on Sheet A681, in manufacturer's standard lengths and in longest lengths practical.
 - a. Basis-of-Design: Product: Gradus "ATR45/PBT12". Comparable products matching profile and characteristics of specified product will be considered.
 - 1) Transition Strip: Provide pre-manufactured two-piece edging.
 - 2) Material: PVC-u top and aluminum base.
 - 3) Gauge: 8-12 mm
 - 4) Width: Top - 45 mm, base - 17.5 mm.
 - 5) Color: As selected from manufacturers full range.
 - 2. Comparable products matching profile and characteristics of specified product will be considered when submitted to and accepted by Architect prior to bidding. Color and textures shall be as selected by Architect from manufacturer's full range of custom options.
 - 3. Fasteners: Provide post-installed expansion anchors with Type 304 stainless steel countersunk fasteners.
 - 4.
- F. Topical Concrete Vapor Sealer: Liquid penetrating type or film-forming type, designed to seal concrete and inhibit moisture transmission through slab. Concrete vapor sealers shall be as recommended by tile carpeting Contractor based upon successful previous installations and as acceptable to tile carpeting manufacturer.
 - 1. Refer to Section 012200 "Unit Prices".
 - 2. Basis of Design Product: Subject to compliance with requirements, provide "Vaporseal HM Plus" by Dependable Floor Products, or a comparable product acceptable to Architect and carpet tile manufacturer, with the following product characteristics:
 - a. Permeance: Less than 0.1 perms when applied at 11 mills (dry film thickness) per ASTM E96.
 - b. Moisture Barrier for slabs up to 100 percent relative humidity per ASTM F2170 and/or 25 pounds MVER per ASTM 1869.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.
- B. Painted Subfloors: Perform bond test recommended in writing by adhesive manufacturer.
 - 1. Access Flooring Systems: Verify the following:
 - 2. Access floor substrate is compatible with carpet tile and adhesive if any.
 - 3. Underlayment surface is flat, smooth, evenly planed, tightly jointed, and free of irregularities, gaps greater than 1/8 inch, protrusions more than 1/32 inch, and substances that may interfere with adhesive bond or show through surface.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.

- D. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by carpet tile manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by carpet tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
 - 4. Moisture Testing of Existing Slabs:
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours, unless a higher rate is accepted by flooring manufacturer in writing.
 - 1) Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than two tests in each installation area and with test areas evenly spaced in installation areas.
 - b. Perform relative humidity test using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 80 percent relative humidity level measurement, unless a higher rate is acceptable to flooring manufacturer.
- E. Concrete Vapor Sealer Application: When concrete vapor sealer is required, prepare surfaces to receive concrete vapor sealer and apply concrete vapor sealer in strict accordance with vapor sealer manufacturer's written instructions to suit slab moisture conditions encountered.
 - 1. Concrete vapor sealer shall be applied as base bid for installation of carpet over existing concrete slabs.
- F. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

- A. Installation: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method:
 - 1. At perimeter of each room/area: Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive.
 - 2. In field of room/area (inside glued down perimeter): install tiles with factory-applied releasable, pressure-sensitive adhesive strips.
- C. Installation Layout: As indicated on Material Finish Legend.
- D. Maintain dye lot integrity. Do not mix dye lots in same area.
- E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, non-staining marking device.
- H. Install pattern parallel to walls and borders.
- I. Metal Transition Strips: Install at locations indicated and between carpet tile and adjacent finishes. Installation shall be in strict accordance with edging manufacturer's written recommendations.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
 - 1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
 - 2. Remove yarns that protrude from carpet tile surface.

3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with CRI's "Carpet Installation Standard," Section 20, "Protecting Indoor Installations."
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 096813

SECTION 097700 - SPECIAL WALL FINISH SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes the following types of pre-engineered architectural wall cladding systems:
 - 1. Pre-manufactured wood panel wall system (097700.A03 – WC1).
- B. Related Sections:
 - 1. Section 061000 "Rough Carpentry" for wood furring for installing paneling.
 - 2. Section 064023 "Interior Architectural Woodwork" for interior trim and molding.

1.2 REFERENCES

- A. American Society for Testing and Materials: Standard Specifications (ASTM):
 - 1. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. Architectural Woodwork Standards as published by the Architectural Woodwork Institute, the Architectural Woodwork Manufacturers Association of Canada, and the Woodwork Institute.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated, in addition to specifications, preparation, and installation instructions.
- B. Shop Drawings: Submit complete shop drawings indicating elevations of each wall, quantities, finishes, dimensions, and attachment relationships for each wall finish system installation. Clearly differentiate each panel type within the system, in addition to indicating panel color, texture, pattern, and orientation of texture/pattern.
 - 1. Clearly indicate dimensions of each special wall finish system, each panel and note location in project.
 - 2. Submit shop drawings showing seams, termination points, and details of edges. Coordinate electrical and plumbing work on shop drawings.
- C. Samples for Initial Selection: For color and finish samples for framing trim and each type of panel finish.
- D. Samples for Verification: For each type of panel and panel system, in manufacturer's standard sizes, but not less than the following:
 - 1. Samples for architectural wall cladding system in aluminum frame, sample shall not be less than 2 feet square. Sample shall illustrate colors and finishes, showing texture range, and consistency of color and finish for each panel type. Sample shall incorporate each type of panel specified and trim along two sides of sample.

1.4 QUALITY ASSURANCE

- A. Manufacturers: Manufacturer for architectural wall cladding system shall have a minimum of five years' experience in manufacturing architectural materials. Single source supplied, wall cladding system consisting of factory mitered and welded framing assemblies and specified infill panels.
- B. Installer Qualifications: Same as manufacturer or approved by manufacturer in writing.
- C. 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. ASTM E 84 (Method of test for surface burning characteristics of building Materials) for Class C.
- D. Mockups/Field Samples: Build mockups/field samples to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockups/field samples for each type of wall covering on each substrate required. Comply with requirements in ASTM F 1141.
 2. Approved mockups/field samples may become part of the completed Work if undisturbed at time of Substantial Completion.
- E. Preinstallation Conference: Conduct conference at Project site.
1. Convene meeting within one week of scheduled start of installation with representatives of the Owner, Construction Manager, Architect, installer, finisher, and painter.
 2. As applicable, review substrate conditions, requirements for related work, installation instructions, seam finishing, painting instructions, storage and handling, and protection measures.
 3. Keep minutes of meeting including responsibilities of various parties.

1.5 PROJECT CONDITIONS

- A. 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 DELIVERY, STORAGE AND HANDLING

- A. Deliver components in clearly marked containers and packages suitable for shipment of specified products so as to prevent damage during transit.
- B. Store components in secured areas with ambient environmental conditions of 25 to 55 percent relative humidity and temperature not to exceed 80 degrees. Store in dry locations that will avoid damage. Do not stack panels directly on floor and do not subject panels to moisture.
- C. Handle panels and components to avoid racking, twisting, denting, scratching of finished surfaces.
1. Store panels flat and protected from moisture.

PART 2 PRODUCTS

2.1 PRE-MANUFACTURED DECORATIVE WOOD WALL PANELS (097700.A03 – **WC1**)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Rulon International, "Panel Grille - No. PG 8-12-22 (DW)" wood panel system consisting of perfectly aligned and spaced solid wood strips using backers for direct attachment. Comparable products from other manufacturers will be considered when submitted to and accepted by Architect prior to bidding.
1. Substitutions for convenience will not be considered.
- B. Profiles: Panel Size: As indicated on the Drawings
1. Number of Blades per foot: 8 blades
 2. Blade Thickness: 3/4 inch
 3. Depth of the Blades: 1-3/8 inches
- C. Panel Design Description: Woodbacked and Doweled Panel Grilles (DW)
- D. Blade Design: As selected by Architect.
- E. Trim and Border Treatment: Provide end caps or junction trims as indicated on the Drawings in the same species and finish as the Panel Grille.
- F. Wood Species: Red Oak
- G. Finish:
1. Slats: Custom Stained to match PL1
 2. Dowels: Custom Painted to match PL2
- H. Installation:
1. Panel Orientation: Vertical

2. Mounting: Direct screw attached.

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 the Work, and as follows:
 1. Walls to receive cladding system shall be dry, flat and rigid.
 2. Vertical alignment (plumbness) of walls shall be within 1/960 (1/8 inch in 10 feet).
 3. Horizontal alignment (levelness) of walls shall be within 1/960 (1/8 inch in 10 feet).
 4. Squareness of walls shall be not more than 1/8 inch out of square within the length of the wall.
 5. Verify that a vapor barrier has been provided on exterior walls behind backing to prevent warping.
 6. Verify backing and mounting surfaces are smooth, solid, and flat. All drywall joints are to be taped and finished.
 7. Verify that walls are sealed, primed, and painted before installation begins.
 8. Verify mechanical, electrical, and building service and/or items affecting work of this section are placed and ready to receive this work.
 9. Wall panels shall be erected plumb, level, square, true-to-line, securely anchored and in proper alignment and relationship to work of other trades. If adjacent work by other trades is out of plumb the tolerances must be corrected prior to proceeding.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Verify dimensions of wall panels prior to installation to assure compatibility with job-site conditions.
- B. Condition wallc by unpacking and placing in installation space before installation according to manufacturer's written recommendations.
- C. Lay out paneling and each type of infill panel before installing.
 1. Mark plumb lines on substrate at frame joint locations for accurate installation.
 2. Locate panel frame and trim accessories to allow clearance at panel edges according to manufacturer's written instructions.

3.3 PRE-MANUFACTURED DECORATIVE WOOD WALL PANELS

- A. Install each system, including frame and grid components, panels and accessories according to manufacturer's written instructions and approved shop drawings.
 1. Grid components shall be plumb, true and level.
 2. Wall panels shall be erected plumb, level, square, true-to-line, securely anchored and in proper alignment and relationship to work of other trades.
- B. Fasten supports and trim using appropriate fasteners into a stud or other solid substrate at centers as specified by the manufacturer. Where screws do not hit the studs, fasten with adhesive in accordance with the manufacturer's recommendations. Pre-drill holes thru the members and fasten the screw flush with the flange on the aluminum profile. Where necessary countersink for the screw head to seat flush with the flange.
- C. All panels with wood substrate must be allowed to acclimate to the project environmental conditions prior to installation.
- D. Avoid contamination of the panel faces with adhesives, solvents or cleaners during installation.

3.4 INSTALLATION TOLERANCES

- A. Variation from Plumb and Level: Plus or minus 1/16 inch.

3.5 CLEANING AND PROTECTION

- A. Visually inspect all exposed surfaces for scratches and blemishes. Remove adhesives, sealants and other stains per manufacturers written instructions.
- B. Protect special wall finishes from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- C. Cover special wall finishes until Substantial Completion.

END OF SECTION 097700

SECTION 097723 - FABRIC WRAPPED PANELS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Shop-fabricated, fabric-wrapped wall panels (097723.A01).
- B. Related Sections:
 - 1. Section 098433 "Sound-Absorbing Wall Units" for shop-fabricated wall panels tested for acoustical performance.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of fabric facing, panel edge, core material, and mounting indicated.
- B. Shop Drawings: For fabric-wrapped wall panels. Include mounting devices and details; details at panel head, base, joints, and corners; and details at ceiling, floor base, and wall intersections. Indicate panel edge and core materials.
 - 1. Include elevations showing panel sizes and direction of fabric weave and pattern matching.
- C. Samples for Verification: For each type of fabric facing from fabric-wrapped, wall panel manufacturer's full range.

1.3 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For fabric-wrapped wall panels to include in maintenance manuals. Include fabric manufacturers' written cleaning and stain-removal recommendations.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain fabric-wrapped wall panels from single source from single manufacturer.
- B. Fire-Test-Response Characteristics: Provide fabric-wrapped wall panels meeting the following as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. Surface-Burning Characteristics: As determined by testing per ASTM E 84, Class A.
- C. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- D. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.
- E. Mockup: Build mockup to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials, fabrication, and installation.
 - 1. Build mockup of typical wall area as indicated by the architect.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with fabric and fabric-wrapped, wall panel manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.
- B. Deliver materials and panels in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install fabric-wrapped wall panels until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work at and 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. Lighting: Do not install fabric-wrapped wall panels until a permanent level of lighting is provided on surfaces to receive fabric-wrapped wall panels.
- C. Air-Quality Limitations: Protect fabric-wrapped wall panels from exposure to airborne odors such as tobacco smoke, and install panels under conditions free from odor contamination of ambient air.
- D. Field Measurements: Verify locations of fabric-wrapped wall panels and actual dimensions of openings and penetrations by field measurements before fabrication.
 - 1. Verify locations of switch plates and other similar items penetrating fabric-wrapped wall panels.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fabric-wrapped wall panels that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Fabric sagging, distorting, or releasing from panel edge.
 - b. Delamination from wall substrate.
 - c. Warping of core.
 - 2. Warranty Period: Two years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Wall materials shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Fire-Test-Response Characteristics: Panels shall comply with "Surface-Burning Characteristics" or "Fire Growth Contribution" Subparagraph below, or both, as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. Surface-Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
 - 2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265 Method B Protocol or NFPA 286.

2.2 FABRIC-WRAPPED WALL PANELS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Conwed.

2. Decoustics Limited; a CertainTeed Ceilings company.
 3. Golterman & Sabo.
 4. Lamvin, Inc.
 5. Signature Craft.
 6. Wall Technology, Inc.; an Owens Corning company.
- B. Fabric-Wrapped Wall Panel (097723.A01): Manufacturer's standard panel construction consisting of fabric facing material laminated to front face, edges, and back edge border of core.
1. Mounting: Back mounted with manufacturer's standard adhesive supplemented with impaling clips, secured to substrate.
 - a. Impaling clips shall be mechanically fastened to substrate.
 2. Core: mineral-fiber board.
 3. Edge Profile: Square.
 4. Corner Detail in Elevation: Square with continuous edge profile indicated.
 5. Facing Material (**WP1**): Luna Textiles, Woohl Matrix
 - a. Colors as indicated on Material Finish Legend.
 - b. Fire Performance Characteristics: Class 1 per ASTM E 84.
 - c. Contents: 60% Post-Consumer Recycled Polyester, 40% Polyester.
 - d. Weight: 17.3 oz/ly.
 6. Facing Material (**WP2**): Carnegie Xorel Fabrics Inc, Meteor.
 - a. Colors as indicated on Material Finish Legend.
 - b. Fire Performance Characteristics: Class A per ASTM E 84.
 - c. Contents: 100 percent IFR Xorel.
 - d. Weight: 12.0 oz/ly.
 7. Facing Material (**WP3**): Maharam, Manner 466177.
 - a. Colors as indicated on Material Finish Legend.
 - b. Fire Performance Characteristics: Class A per ASTM E 84.
 - c. Contents: 65% Post-industrial recycled Polyester, 35% Post-Consumer Recycled Polyester
 - d. Weight: 16.9 oz/ly.
 8. Nominal Overall Panel Thickness: 3/4 inch.
 9. Panel Width: As indicated on Drawings.
 10. Panel Height: As indicated on Drawings.

2.3 MATERIALS

- A. Core Materials:
1. Mineral-Fiber Board: Maximum flame-spread and smoke-developed indexes of 25 and 10, respectively; minimum density of 20 lb/cu. ft. (320 kg/cu. m).
 - a. Basis of Design: Provide Micore MC300-SC with coated face as manufactured by USG or a comparable product submitted to and accepted by Architect prior to bidding.
 - b. Joint Treatment Material: As recommended by mineral fiber board manufacturer to create smooth uniform joints between core panels that will not telegraph through facing material.
- B. Facing Material: Fabric from same dye lot; color and pattern as indicated on Drawings.
- C. Mounting Devices: Concealed on back of panel, utilize adhesive supplemented with impaling clips as recommended by manufacturer to support weight of panel, and as follows:
1. Adhesives: As recommended by fabric-wrapped, wall panel manufacturer.
 - a. Adhesives shall have a VOC content of 70 g/L or less.
 - b. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
 2. Impaling Clips: Manufacturer's standard.

2.4 FABRICATION

- A. General: Use manufacturer's standard construction except as otherwise indicated; with facing material applied to face, edges, and back border of dimensionally stable core; and with rigid edges to reinforce panel perimeter against warpage and damage.

- B. Fasten facing material to core as recommended by facing material manufacturer.
- C. Mineral-Fiber Board Cores: Chemically harden core edges and areas of core where mounting devices are attached.
- D. Facing Material: Apply fabric fully covering visible surfaces of panel; with material stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other visible distortions or foreign matter.
 - 1. Square Corners: Tailor corners.
 - 2. Fabrics with Directional or Repeating Patterns or Directional Weave: Mark fabric top and attach fabric in same direction so pattern or weave matches in adjacent panels.
- E. Dimensional Tolerances of Finished Panels: Plus or minus 1/16 inch (1.6 mm) for the following:
 - 1. Thickness.
 - 2. Edge straightness.
 - 3. Overall length and width.
 - 4. Squareness from corner to corner.
 - 5. Chords, radii, and diameters.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine fabric, fabricated panels, substrates, areas, and conditions, for compliance with requirements, installation tolerances, and other conditions affecting performance of fabric-wrapped wall panels.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install fabric-wrapped wall panels in locations indicated with vertical surfaces and edges plumb, top edges level and in alignment with other panels, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.
 - 1. For monolithic installation, adhere core to wall substrate, treat panel joints and apply liner material to entire surface to receive facing material. Install wall liner, with no gaps or overlaps, to form a smooth wrinkle-free surface for finished installation. Do not begin facing material installation until wall liner has dried.
- B. Comply with fabric-wrapped, wall panel manufacturer's written instructions for installation of panels using adhesive type mounting supplemented with impaling devices indicated. Mount panels securely to supporting substrate.
- C. Align and level fabric pattern and grain among adjacent panels.

3.3 INSTALLATION TOLERANCES

- A. Variation from Plumb and Level: Plus or minus 1/16 inch.
- B. Variation of Panel Joints from Hairline: Not more than 1/16 inch wide.

3.4 CLEANING

- A. Clip loose threads; remove pills and extraneous materials.
- B. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION 097723

SECTION 098433 - ACOUSTICAL WALL UNITS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes shop-fabricated, cementitious-fiber primed units and fabric-wrapped, sound-absorbing wall panel units tested for acoustical performance, including:
 - 1. Sound-Absorbing Wall Panels (098433.A01 – AP1).
- B. Related Requirements:
 - 1. Section 098436 "Acoustical Ceiling Units" for shop-fabricated ceiling panels tested for acoustical performance.
 - 2. Section 099123 "Interior Painting" for field finishing of cementitious-fiber sound-absorbing panels.

1.2 DEFINITIONS

- A. NRC: Noise Reduction Coefficient.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of fabric facing, panel edge, core material, and mounting indicated.
- B. Shop Drawings: For each type of sound-absorbing wall units. Include mounting devices and details; details at panel head, base, joints between panels and corners; sections through each type of panel, and details at ceiling and wall intersections. Indicate panel edge, core and facing materials.
 - 1. Include elevations showing layout of panels and panel sizes; direction of fabric weave and pattern matching.
- C. Samples for Verification: For each type of panel, submit an actual panel, not less than 12 inches square by full thickness.
 - 1. Submit samples for each type of fabric facing for sound-absorbing wall units.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sound-absorbing wall units to include in maintenance manuals. Include fabric manufacturers' written cleaning and stain-removal recommendations.

1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain sound-absorbing wall units from single source from single manufacturer.
- B. Fire-Test-Response Characteristics: Provide sound-absorbing wall units meeting the following as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. Surface-Burning Characteristics: As determined by testing per ASTM E 84.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
 - 2. Fire Growth Contribution: Meeting acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265.

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

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with sound-absorbing wall unit manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.
- B. Comply with fabric manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.
- C. Deliver materials and units in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install sound-absorbing wall units until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work at and 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. Lighting: Do not install sound-absorbing wall units until a permanent level of lighting is provided on surfaces to receive the units.
- C. Air-Quality Limitations: Protect sound-absorbing wall units from exposure to airborne odors, such as tobacco smoke, and install units under conditions free from odor contamination of ambient air.
- D. Field Measurements: Verify locations of sound-absorbing wall units and actual dimensions of openings and penetrations by field measurements before fabrication.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sound-absorbing wall units that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to the following:
 - a. Acoustical performance.
 - b. Fabric sagging, distorting, or releasing from panel edge.
 - c. Warping of core.
 - 2. Warranty Period: Two years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 SOUND-ABSORBING WALL PANELS (098433.A01 – **AP1**).

- A. Basis of Design Products: Subject to compliance with requirements, provide "Acousti-Panels" by Golterman & Sabo Acoustics or a comparable product by one of the listed acceptable manufacturers with the following product characteristics:
 - 1. Acceptable Manufacturers:
 - a. Conwed Designscape, Owens Corning.
 - b. Decoustics Limited, CertainTeed.
 - c. Kinetics Noise Control.
 - d. RPG Acoustical Systems.
 - e. Sound Seal.
 - f. Signature Craft.
 - g. Wall Technology, Owens Corning.

2. Description: Manufacturer's standard panel construction consisting of facing material stretched over front face of edge-framed core and bonded or attached to edges and back of frame.
3. Mounting: Back mounted with manufacturer's standard magnetic devices or metal clips or bar hangers, secured to substrate.
4. Core: glass-fiber board, 6 to 7 pcf density.
5. Edge Construction: Manufacturer's standard chemically hardened core with no frame, or extruded-aluminum or zinc-coated, rolled-steel frame.
6. Edge Profile: As indicated.
7. Facing Material: As indicated in Material Finish Legend.
8. Nominal Core Thickness: 2".
9. Panel Width: As indicated on Drawings.
10. Panel Height: As indicated on Drawings.
11. Acoustic Performance:
 - a. NRC of 1.05 per ASTM C423.

2.2 MATERIALS

- A. Core Materials:
 1. Glass-Fiber Board Backing: ASTM C 612, Type standard with manufacturer; nominal density of 6 to 7 lb/cu. ft., unfaced, and dimensionally stable, molded rigid board; and with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.
- B. Facing Materials: Fabric from same dye lot and as follows:
 1. Basis-of-Design Product: Subject to compliance with requirements, provide Carnegie; Xorel "Meteor", or comparable product from another manufacturer submitted to and accepted by Architect prior to bidding.
 2. Contents: 100 percent post-consumer recycled polyester.
 3. Flame Retardancy: Class A per ASTM E 84.
 4. Color and Pattern: As indicated on Material Finish Legend.
- C. Mounting Devices: Concealed on back of unit, as recommended by manufacturer to support weight of unit, and as follows:
 1. Manufacturer's recommended adhesive.
 2. Metal Clips or Bar Hangers: Manufacturer's standard two-part metal "Z" clips, with one part of each clip mechanically attached to back of unit and the other part to substrate, designed to permit unit removal.
 3. Magnetic Strip or Devices: Manufacturer's standard.

2.3 FABRICATION

- A. General: Use manufacturer's standard construction except as otherwise indicated; with facing material applied to face, edges, and back border of dimensionally stable core; and with rigid edges to reinforce panel perimeter against warpage and damage.
 1. Glass-Fiber Board Cores: Chemically harden core edges and areas of core where mounting devices are attached.
- B. Facing Material: Apply fabric facing fully covering visible surfaces of unit; with material stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other visible distortions or foreign matter.
 1. Square Corners: Tailor corners.
 2. Fabrics with Directional or Repeating Patterns or Directional Weave: Mark fabric top and attach fabric in same direction so pattern or weave matches in adjacent units.
- C. Dimensional Tolerances of Finished Units: Plus or minus 1/16 inch for the following:
 1. Thickness.
 2. Edge straightness.
 3. Overall length and width.
 4. Squareness from corner to corner.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fabric, fabricated units, substrates, areas, and conditions, for compliance with requirements, installation tolerances, and other conditions affecting performance of sound-absorbing wall units.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install sound-absorbing wall units in locations indicated with vertical surfaces and edges plumb, top edges level and in alignment with other units, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.
- B. Comply with sound-absorbing wall unit manufacturer's written instructions for installation of units using type of mounting specified. Mount units securely to supporting substrate.
- C. Align and level fabric pattern and grain among adjacent units.
- D. INSTALLATION OF GFRG:
 - 1. Comply with ASTM C1467 Standard for the Installation of Molded Glass Fiber Reinforced Gypsum Parts.
 - 2. It is the Installer's responsibility to verify scope and to order the correct quantities of parts (including a waste allowance).
 - 3. Supply and install all shims and brackets required for work in this section and to ensure a solid and secure installation of GRG parts.
 - 4. Position GRG parts carefully into place and align with adjacent parts and materials in accordance to the drawings. Attach GRG parts to substrates and framing with fastening devices as specified by the GRG manufacturer. Use concealed shims as required and countersink screws below the surrounding surface.
 - 5. Where GRG parts are suspended, use the suspension points indicated on the shop drawings as a minimum requirement and use additional support(s) if required.
 - 6. Install control joints between GRG parts as indicated and as required by the manufacturer.
 - 7. Use joint-treatment materials to finish GRG parts and assemblies to produce surfaces ready to receive primers and paint finishes as detailed. Note: Unfinished GRG parts may exhibit slight imperfections, normally hidden by a textured finished. To obtain satisfactory results with smooth finishes, filling and sanding will be required to hide imperfections inherent in GRG.
 - 8. Countersunk fasteners and damage to be patched to match the GRG part's texture.
 - 9. Finishing of the GRG parts to be carried out by the painting contractor. Proper sealing of the finished GRG assemblies must be provided to avoid joint tape read through. For more information, consult the ASTM C840.

3.3 INSTALLATION TOLERANCES

- A. Variation from Plumb and Level: Plus or minus 1/16 inch.
- B. Variation of Panel Joints from Hairline: Not more than 1/16 inches wide.

3.4 CLEANING

- A. Clip loose threads; remove pills and extraneous materials.
- B. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION 098433

SECTION 098436 - ACOUSTICAL CEILING UNITS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes shop-fabricated, pre-finished panel units tested for acoustical performance, including:
 - 1. Sound-Absorbing Ceiling Panels (098436.A01 – **CLG4**).
- B. Related Requirements:
 - 1. Section 012300 "Alternates" for those alternates affecting work of this Section.
 - 2. Section 092900 "Gypsum Board" for sound absorptive perforated gypsum board.
 - 3. Section 098433 "Sound-Absorbing Wall Units" for shop-fabricated fabric-wrapped wall panels tested for acoustical performance.

1.2 DEFINITIONS

- A. NRC: Noise reduction coefficient.
- B. SAA: Sound absorption average.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, mounting, material descriptions, dimensions of individual components and profiles, and finishes for sound-absorbing ceiling units.
 - 2. Include fabric facing, panel edge and ends, core material, and mounting indicated.
 - 3. Include furnished specialties and accessories.
- B. Shop Drawings: For unit assembly and installation.
 - 1. Include reflected ceiling plans, elevations, sections, and mounting devices and details.
 - 2. Include details at joints and corners; and details at ceiling intersections and intersections with walls. Indicate panel edge and end profiles and core materials.
 - 3. Include direction of fabric weave and pattern matching.
- C. Samples for Initial Selection: For each type of fabric facing.
 - 1. Include Samples of hardware and accessories involving color or finish selection.
- D. Samples for Verification: For the following products:
 - 1. Fabric: Full-width by approximately 24-inch- long Sample, but not smaller than required to show complete pattern repeat, from dye lot to be used for the Work, and with specified treatments applied. Mark top and face of fabric.
 - 2. Panel Edge: 12-inch-long Sample(s) showing each edge profile, corner, and finish.
 - 3. Core Material: 12-inch-square Sample at corner.
 - 4. Mounting Devices: Full-size Samples.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Suspended ceiling components above ceiling units.

2. Structural members to which suspension devices will be attached.
3. Items penetrating or covered by units including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Alarms.
 - e. Sprinklers.
 - f. Access panels.

B. Product certificates: For each type of sound-absorbing ceiling unit.

C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sound-absorbing and sound diffusing ceiling units to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Integrated Field Sample: Build integrated field samples to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials, fabrication, and installation.
1. Build mockup of each type of typical baffle.
 2. Approval of field samples does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 3. Subject to compliance with requirements, approved field sample may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with sound-absorbing ceiling unit manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.
- B. Deliver materials and units in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not install units until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work at and 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. Lighting: Do not install units until a permanent level of lighting is provided on surfaces to receive the units.
- C. Air-Quality Limitations: Protect units from exposure to airborne odors, such as tobacco smoke, and install units under conditions free from odor contamination of ambient air.
- D. Field Measurements: Verify unit locations and actual dimensions of openings and penetrations by field measurements before fabrication, and indicate them on Shop Drawings.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of sound-absorbing ceiling units that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Acoustical performance.
 - b. Fabric sagging, distorting, or releasing from panel edge.
 - c. Warping of core.

2. Warranty Period: Two years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Armstrong Ceiling Solutions.
 2. Conwed Designscape; an Owens Corning company.
 3. Decoustics Limited; a CertainTeed Ceilings company.
 4. Golterman & Sabo.
 5. Signature Craft.
 6. SoundSeal.
 7. Turf.
 8. Wall Technology, Inc.; an Owens Corning company.
 9. Wenger.
- B. Source Limitations: Obtain sound-absorbing ceiling units from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: Provide sound-absorbing ceiling units meeting the following requirements as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 1. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
 2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 286.
- B. Ceiling materials shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.3 CEMENTITIOUS SOUND-ABSORBING CEILING UNITS

- A. Sound-Absorbing Ceiling Panels (098436.A01 – **CLG4**): Cementitious-fiber cement panels on furring strips with sound absorbing insulation fill between furring.
 1. Mounting: Face mounted with manufacturer's standard corrosion-resistant mechanical fasteners and with manufacturer's type C-20 mounting system.
 2. Core: 2 inch thick cementitious-fiber board.
 3. Edge Profile: Chamfered (beveled) on all four sides Acoustical Performance: Sound absorption NRC of not less than 0.95 according to ASTM C423 for use with C-20 mounting.
 4. Panel Width: As indicated on Drawings.
 5. Panel Length: As indicated on Drawings.
 6. Finish: Refer to Material Finish Legend.
 7. Basis of Design: "Tectum Direct Attached Interior Ceiling Panels" by Armstrong.
 - a. Comparable products from other manufacturers meeting specified requirements which are submitted to and accepted by Architect prior to bidding will be considered.

2.4 MATERIALS

- A. Core Materials:
 1. Cementitious-Fiber Board: Density of not less than 20 lb/cu. ft.
 2. Fire-Retardant Formed Fiberglass-Reinforced Plastic: Manufacturer's standard formed plastic with flame-spread index of 25 or less and smoke-developed index of 25 or less according to ASTM E 84.

- 3. Polyester Core: Manufacturer standard formulation with a flame-spread index of 10 or less and a smoke-developed Index of 185 or less according to ASTM E 84.
- B. Mounting Devices: Concealed on back of unit, recommended by manufacturer to support weight of unit.
- C. Fasteners: Provide stainless steel fasteners designed for mechanical attachment to concrete substrates, similar to "410 Stainless Steel Series" by Tapcon.

2.5 FABRICATION

- A. General: Use manufacturer's standard construction except as otherwise indicated; with dimensionally stable core and with rigid edges to reinforce panel perimeter against warpage and damage.
- B. Dimensional Tolerances of Finished Units: Plus or minus 1/16 inch for the following:
 - 1. Thickness.
 - 2. Edge straightness.
 - 3. Overall length and width.
 - 4. Squareness from corner to corner.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine fabricated units, substrates, areas, and conditions for compliance with requirements, installation tolerances, and other conditions affecting performance of sound-absorbing ceiling units.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install units in locations indicated. Unless otherwise indicated, install units with edges in alignment with walls and other units, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.
- B. For each type of diffuser and baffle, comply with unit manufacturer's written instructions and approved shop drawings, for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.

3.3 INSTALLATION TOLERANCES

- A. Variation from Alignment with Surfaces: Plus or minus 1/16 inch.
- B. Variation from Level or Slope: Plus or minus 1/16 inch.
- C. Variation of Panel Joints from Hairline: Not more than 1/16 inch wide.

3.4 CLEANING

- A. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION 098436

SECTION 099113 - EXTERIOR PAINTING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of exterior paint systems on the following exterior substrates:
 - 1. Concrete.
 - 2. Fiber-cement board siding and trim.
 - 3. Concrete masonry units (CMUs).
 - 4. Steel and iron.
 - 5. Galvanized metal.
 - 6. Aluminum (not anodized or otherwise coated).
 - 7. Wood.
 - 8. Steel doors and frames.
 - 9. Railings and guardrails.
 - 10. Miscellaneous mechanical, electrical, plumbing, fire suppression, communication and technology work as delineated in this section.
- B. Related Requirements:
 - 1. Section 051200 "Structural Steel Framing" for shop priming of metal substrates.
 - 2. Section 055000 "Metal Fabrications" for shop priming metal fabrications.
 - 3. Section 055213 "Pipe and Tube Railings" for shop priming pipe and tube railings.
 - 4. Section 099123 "Interior painting" for surface preparation and the application of paint systems on interior substrates.
 - 5. Section 099600 "High-Performance Coatings" for special-use coatings.

1.2 DEFINITIONS

- A. Gloss Level 1 "Matte": Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 3 "Eggshell": 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 4 "Satin-like": 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level 5 "Semi-gloss": 35 to 70 units at 60 degrees, according to ASTM D 523.
- E. Gloss Level 6 "Gloss": 70 to 85 units at 60 degrees, according to ASTM D 523.
- F. Gloss Level 7 "High Gloss": More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Indicate VOC content.
- B. Samples for Initial Selection: Where colors are not indicated on Drawings, submit for each type of topcoat product.
- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Apply coats on Samples in steps to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.

- D. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas.
 - 2. Use same designations indicated on Drawings and in schedules.
 - 3. Include color designations.

1.4 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. Paint: Two (2) gallons of each material and color applied.
 - 2. Draw downs of each color and type used to be included in O&Ms.
 - 3. Identify using the same designation as found on the finish schedule in the operations and maintenance manual.

1.5 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
 - b. Other Items: Architect will designate items or areas required.
 - 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 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.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers - Basis of Design Products: Subject to compliance with requirements, provide products scheduled by The Sherwin-Williams Company, or comparable products from other manufacturers submitted to and accepted by Architect and Owner prior to bidding.

2.2 PAINT, GENERAL

- A. Material Compatibility:
 - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- B. VOC Content: For field applications, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
 - 1. Flat Paints and Coatings: 50 g/L.
 - 2. Nonflat Paints and Coatings: 50 g/L.
 - 3. Dry-Fog Coatings: 150 g/L.
 - 4. Primers, Sealers, and Undercoaters: 100 g/L.
 - 5. Rust-Preventive Coatings: 100 g/L.
 - 6. Zinc-Rich Industrial Maintenance Primers: 100 g/L.
 - 7. Pretreatment Wash Primers: 420 g/L.
 - 8. Shellacs, Clear: 730 g/L.
 - 9. Shellacs, Pigmented: 550 g/L.
- C. Colors: Where not indicated on Drawings, as selected by Architect from manufacturer's full range.
 - 1. Twenty percent of surface area will be painted with deep tones.
- D. Paint Systems: Refer to schedule at end of this Section.

2.3 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
 - 1. Owner may engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 - 2. Testing agency will perform tests for compliance with product requirements.
 - 3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Fiber-Cement Board: 12 percent.
 - 3. Masonry (Clay and CMUs): 12 percent.
 - 4. Wood: 15 percent.
 - 5. Gypsum Board: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer, but not less than the following:
 - 1. SSPC-SP 3.
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Aluminum Substrates: Remove loose surface oxidation.
- J. Wood Substrates:
 - 1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
 - 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.
 - 5. For existing wood substrates, pressure wash as recommended by in writing by topcoat manufacturer. Pressure wash at lowest pressure possible as to not damage wood substrate.
- K. Fiber-cement and cellular PVC Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
 - 3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
 - 4. Paint entire exposed surface of window frames and sashes.
 - 5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.
 - 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. Miscellaneous Painting of Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 1. Paint the following work where exposed to view:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - 1) Also includes gas lines on roof.
 - c. Uninsulated plastic piping.
 - 1) Also includes PVC condensate lines on roof.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Tanks that do not have factory-applied final finishes.

3.4 FIELD QUALITY CONTROL

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

3.5 CLEANING AND PROTECTION

- 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. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

- A. Concrete Traffic Paint:
 1. The Sherwin-Williams Company.
 - a. 1st Coat: S-W Conflex Flexible Concrete Waterproof, A5 Series (Textured or Smooth)
 - b. 2nd Coat: S-W Conflex Flexible Concrete Waterproof, A5 Series (Textured or Smooth)
 - 1) (10-12 mils wet per coat)
- B. Concrete, including structural precast:
 1. The Sherwin-Williams Company.
 - a. 1 coat Loxon Concrete and Masonry Primer.

- b. 2 coats Loxon Acrylic Masonry Coating, satin.
- C. Concrete, including structural precast – (Elastomeric, high build system not less than 10 mils):
 - 1. The Sherwin-Williams Company.
 - a. 2 coats Loxon XP High Build, satin (water vapor permeance of not less than 9 perms when tested according to ASTM D 1653).
- D. Cement Board Substrates:
 - 1. The Sherwin-Williams Company.
 - a. Loxon masonry primer.
 - b. 2 coats Pro Industrial Acrylic B66 Series.
- E. CMU Substrates:
 - 1. The Sherwin-Williams Company.
 - a. 1 coat Loxon Surfacer.
 - b. 2 coats ConFlex XL, high build, smooth elastomeric coating.
- F. Steel Substrates - Unprimed:
 - 1. The Sherwin-Williams Company.
 - a. 1 coat Pro Industrial Pro-Cryl Universal WB Acrylic Primer.
 - b. 2 coats Pro Industrial WB Alkyd Urethane.
- G. Steel Substrates - Primed:
 - 1. The Sherwin-Williams Company.
 - a. 1 touchup coat Pro Industrial Pro-Cryl Universal WB Acrylic Primer.
 - b. 2 coats Pro Industrial WB Alkyd Urethane.
- H. Steel Substrates – Galvanized (except handrails and guardrails):
 - 1. The Sherwin-Williams Company.
 - a. 2 coats A-100 Latex, satin.
- I. Galvanized Steel Substrates – (except railings, handrails and guardrails):
 - 1. The Sherwin-Williams Company.
 - a. 1 touchup coat Pro Industrial Pro-Cryl Universal WB Acrylic Primer.
 - b. 2 coats Pro Industrial WB Alkyd Urethane.
- J. Primed Steel Doors and Frames:
 - 1. The Sherwin-Williams Company.
 - a. 1 coat of Pro Industrial Pro-Cryl Universal WB Acrylic Primer.
 - b. 2 coats Pro Industrial WB Alkyd Urethane.
- K. Metal Panel Substrates (existing metal wall panels):
 - 1. The Sherwin-Williams Company.
 - a. Prepare surfaces in strict accordance with paint manufacturer's recommendations. Minimum surface preparation shall be according to SSPC-SP WJ-4/NACE WJ-4 "Light Cleaning" requirements, unless otherwise recommended by paint manufacturer to suit conditions of substrates involved.
 - 1) 1 coat DTM Bonding Primer.
 - b. 2 coats Bond-Plex Waterbased Acrylic Coating, low sheen.
- L. Aluminum Substrates:
 - 1. The Sherwin-Williams Company.
 - a. 2 coats A-100 Latex, satin.
- M. Portland Cement Plaster (Stucco) Substrates:
 - 1. The Sherwin-Williams Company.
 - a. 1 coat Loxon XP Waterproof Coating.
 - b. 2 coats ConFlex XL High Build (smooth first coat and textured second coat).
- N. Fiber-Cement Siding:
 - 1. The Sherwin-Williams Company.
 - a. 1 coat touch-up primer as recommended by topcoat manufacturer.

- b. 2 coats A-100 Latex, satin.

END OF SECTION 099113

This page intentionally left blank

SECTION 099123 - INTERIOR PAINTING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following interior substrates:
 - 1. Concrete.
 - 2. Concrete masonry units (CMUs).
 - 3. Steel and iron.
 - 4. Galvanized metal.
 - 5. Aluminum (not anodized or otherwise coated).
 - 6. Wood.
 - 7. Gypsum board.
 - 8. Plaster.
 - 9. Miscellaneous mechanical, electrical, plumbing, fire suppression, communication and technology work as delineated in this Section.
- B. Related Requirements:
 - 1. Section 012100 "Allowances" for those allowances affecting work of this Section.
 - 2. Section 012200 "Unit Prices" for unit prices affecting work of this Section.
 - 3. Section 012300 "Alternates" for those alternates related to work of this Section.
 - 4. Section 051200 "Structural Steel Framing" for shop priming structural steel.
 - 5. Section 099113 "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.
 - 6. Section 099300 "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on interior wood substrates.
 - 7. Section 099600 "High-Performance Coatings" for special-use coatings.

1.2 DEFINITIONS

- A. Gloss Level 1 "Matte": Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 2 "Flat": Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 3 "Eggshell": 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level 4 "Satin-like": 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. Gloss Level 5 "Semi-gloss": 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. Gloss Level 6 "Gloss": 70 to 85 units at 60 degrees, according to ASTM D 523.
- G. Gloss Level 7 "High Gloss": More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Indicate VOC content.
- B. Samples for Initial Selection: Where colors are not specifically indicated, submit for each type of topcoat product.
- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches square.

2. Label each coat of each Sample.

- D. Product List: For each product indicated, include the following:
1. Cross-reference to paint system and locations of application areas.
 2. Use same designations indicated on Drawings and in schedules.
 3. Include color designations.
 4. VOC content.

1.4 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. Paint: 1 gallon of each material and color applied.

1.5 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Architect will select one surface to represent surfaces and conditions for application of each paint system.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
 - b. Other Items: Architect will designate items or areas required.
 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 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.
1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers - Basis of Design Products: Subject to compliance with requirements, provide products by The Sherwin-Williams Company, or comparable products from other manufacturers submitted to and accepted by Architect and Owner prior to bidding.

2.2 PAINT, GENERAL

- A. Material Compatibility:
 - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- B. VOC Content: For field applications, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits for paints and paint colorants:
 - 1. Paints and Coatings: Less than 50 g/L.
- C. Low-Emitting Materials: For field applications that are inside the weatherproofing system, 90 percent of paints and coatings shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- D. Colors: Where not indicated on Drawings, as selected by Architect from manufacturer's full range.
 - 1. Twenty percent of surface area will be painted with deep tones.
- E. Material Finish Schedule designations: As indicated on Material Finish Legend.
 - 1. Provide "flat" sheen for ceilings, unless otherwise specified.
- F. Provide "eggshell" sheen for walls, unless otherwise specified.
- G. Paint Systems: Refer to schedule at end of this Section.

2.3 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
 - 1. Owner may engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 - 2. Testing agency will perform tests for compliance with product requirements.
 - 3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Masonry (Clay and CMUs): 12 percent.
 - 3. Wood: 15 percent.
 - 4. Gypsum Board: 12 percent.
 - 5. Plaster: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Plaster Substrates: Verify that plaster is fully cured.

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

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, marker boards and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove all surface contamination such as release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
 - 1. Wash previously painted surfaces with an abrasive cleanser and dull in one operation, or wash thoroughly and dull by sanding. Spot prime any bare areas with an appropriate primer.
 - 2. Verify that chemical removal agents (if used) have been neutralized prior to installation of paint products.
- E. Masonry Substrates: Remove all surface contamination such as oil, grease, loose paint, mill scale, dirt, foreign matter, rust, mold, mildew, mortar, efflorescence and sealers. Wash surfaces with an abrasive cleanser and dull in one operation, or wash thoroughly and dull by sanding. Spot prime any bare areas with an appropriate primer.
 - 1. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
- F. Existing Brick Substrates: Remove all surface contamination such as oil, grease, loose paint, mill scale, dirt, foreign matter, rust, mold, mildew, efflorescence and sealers. Wash surfaces thoroughly. Where brick has been previously painted or sealed, wash surfaces with an abrasive cleanser and dull in one operation, or wash thoroughly and dull by sanding. Spot prime any bare areas of previously painted brick with specified primer.
- G. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer, but not less than the following:
 - 1. SSPC-SP 3.
- H. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- I. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- J. Aluminum Substrates: Remove loose surface oxidation.
- K. 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.
- L. Existing Wood Door Substrates:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Repair any major aesthetic and structural imperfections with epoxy hardening compound.

3. Sand surfaces that will be exposed to view, and dust off.
 4. Prime edges, ends, faces, undersides, and backsides of wood.
 5. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler.
- M. Existing Substrates: Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
1. Prepare substrates in accordance with paint manufacturer's recommendations to ensure adhesion.

3.3 APPLICATION

- A. Apply paints according to paint manufacturer's written instructions and to recommendations.
1. Use applicators and techniques suited for paint and substrate indicated.
 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed 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. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
 6. Paint exposed air diffusers and grilles same color as adjacent wall or ceiling finish as directed by Architect.
 7. Mask off surfaces of doors prior to painting vision lite frames. Clean any excess paint from door surface to so that there is no evidence of excess paint remaining on door face and glass.
- 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.
- 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. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
1. Paint the following work where exposed in occupied spaces:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - h. Other items as directed by Architect.
 2. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.
- F. Marking and Identification: Fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions or any other walls required to have protected openings and penetrations shall be permanently identified with stenciling. Such identification shall:
1. Be located in accessible concealed floor, floor/ceiling or attic spaces;
 2. Be located within 15 feet of the end of each wall and at intervals not exceeding 30 feet measured horizontally along the wall or partition; and
 3. Shall include lettering not less than 3 inches in height with a minimum 3/8-inch wide stroke in a contrasting color incorporating the following wording on the first line: "FIRE AND/OR SMOKE BARRIER – PROTECT ALL OPENINGS".
- G. Green Screen Paint System:
1. Refer to paint manufacturer's installation requirements for items including but not limited to: nap size and type, roller direction during application, storage and handling during application.

2. Apply in three coats at rate recommended by paint manufacturer.

3.4 FIELD QUALITY CONTROL

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

3.5 CLEANING AND PROTECTION

- 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. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

- A. Existing Cementitious Wood Fiber Ceiling Panels:
 1. The Sherwin-Williams Company.
 - a. Seal all water stains using primer/sealer recommended by topcoat manufacturer in aerosol.
 - b. 2 coats Pro-Industrial Waterborne Acrylic Dryfall.
- B. New Cementitious Wood Fiber Ceiling Panels (099123.A07):
 1. The Sherwin-Williams Company.
 - a. 2 coats Pro Industrial Waterborne Acrylic Dryfall
- C. Concrete Substrates, Wall Surfaces – Latex System:
 1. The Sherwin-Williams Company.
 - a. 1 coat ProMar 200 Zero VOC Interior Latex Primer.
 - b. 2 coats ProMar 200 Zero VOC Latex, Eggshell
 2. General: Concrete floor coating system shall provide a minimum static coefficient of friction of 0.60 per ASTM C1028.
 - a. Manufacturer shall provide recommended additive to paint at a rate as acceptable to Owner and Architect, but not less than that required to achieve performance indicated above.
 3. Benjamin Moore & Co.
 - a. 1 coat primer as recommended by manufacturer for substrate indicated.
 - b. 2 coats of comparable product submitted to and accepted by Architect and Owner.
 4. PPG Paints.
 - a. 1 coat primer as recommended by manufacturer for substrate indicated.
 - b. 2 coats of comparable product submitted to and accepted by Architect and Owner.
 5. The Sherwin-Williams Company.
 - a. 2 coats Armorseal Tread-Plex, 100% Acrylic, semigloss.
 - 1) at 1.5 to 2 dry mills per coat.
- D. Portland Cement Plaster Substrates, Wall Surfaces - Latex System:
 1. The Sherwin-Williams Company.
 - 1) 1 coat Loxon Concrete and Masonry Primer, LX02 Series.
 - 2) 2 coats ProMar 200 Zero VOC Latex, Eggshell
- E. Portland Cement Plaster Substrates, Wall Surfaces - Latex System:

1. The Sherwin-Williams Company.
 - 1) 1 touchup coat ProMar 200 Zero VOC Interior Latex Primer (spot prime bare areas).
 - 2) 2 coats ProMar 200 Zero VOC Latex, Eggshell
- F. Portland Cement Plaster Substrates, Ceiling Surfaces - Latex System:
 1. The Sherwin-Williams Company.
 - 1) 1 coat Loxon Concrete and Mason Primer, LX02 Series.
 - 2) 2 coats Pro Industrial Waterborne Acrylic Dryfall.
- G. Portland Cement Plaster Substrates, Ceiling Surfaces - Latex System:
 1. The Sherwin-Williams Company.
 - 1) 1 touchup coat ProMar 200 Zero VOC Interior Latex Primer (spot prime bare areas).
 - 2) 2 coats Pro Industrial Waterborne Acrylic Dryfall.
- H. CMU Substrates – Latex System:
 1. The Sherwin-Williams Company.
 - 1) 1 touchup coat ProMar 200 Zero VOC Interior Latex Primer (spot prime bare areas).
 - 2) 2 coats ProMar 200 Zero VOC Latex, Eggshell
- I. CMU Substrates, Wall Surfaces - Latex System.
 1. The Sherwin-Williams Company.
 - a. Block Filler: Pro Industrial Heavy Duty Block Filler, B42W150.
 - 1) at 16.0 mils wet, 8.0 mils dry.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series, eggshell.
 - 1) at 4.0 mils wet, 1.7 mils dry, per coat.
 2. The Sherwin-Williams Company. (For gyms, Corridors, cafeterias, and toilets).
 - a. Block Filler: Pro Industrial Heavy Duty Block Filler, B42W150.
 - 1) at 16.0 mils wet, 8.0 mils dry.
 - b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
 - c. Topcoat: Pro Industrial Pre-Catalyzed Water Based Epoxy, K45-1151 Series, eggshell.
 - 1) at 4.0 mils wet, 1.5 mils dry, per coat.
- J. CMU Substrates – Epoxy System: Refer to Section 099600.
- K. Steel Substrates – Non-primed:
 1. The Sherwin-Williams Company.
 - a. 1 coat of Pro Industrial Pro-Cryl Universal WB Acrylic Primer.
 - b. 2 coats Pro Industrial WB Alkyd Urethane, semigloss.
- L. Steel Substrates – Pre-primed:
 1. The Sherwin-Williams Company.
 - a. 1 coat of Pro Industrial Pro-Cryl Universal WB Acrylic Primer.
 - b. 2 coats Pro-Industrial Acrylic.
- M. Steel Hollow Metal Doors and Frames (including doors, frames, metal glass stops, vision lite frames, astragals and metal louvers):
 1. The Sherwin-Williams Company.
 - a. Prime Coat: Rust-inhibitive: Pro Industrial Pro-Cryl Universal Primer, B66-310 Series.
 - 1) at 5.0 to 10 mils wet, 2.0 to 4.0 mils dry.
 - b. Intermediate Coat: Matching topcoat.
 - c. Topcoat: Industrial Enamel, Gloss
 - 1) at 4.0 mils wet, 1.5 mils dry, per coat.
- N. Steel Substrates (exposed metal decking, bar joists and exposed overhead structure) – Dryfall.
 - a. 2 coats Speedhide Supertech Acrylic Dryfall.
 2. The Sherwin-Williams Company.
 - a. Top Coat: Pro Industrial Waterborne Acrylic Dryfall Flat, B42-181 Series, flat.
 - 1) at 6.0 mils wet, 1.5 mils dry.
 - b. Top Coat: Pro Industrial Waterborne Acrylic DryFall Eg-Shel, B42-82, eggshell.
 - 1) at 6.0 mils wet, 1.9 mils dry.
- O. Galvanized-Metal Substrates (where not specifically indicated to be painted):

1. The Sherwin-Williams Company.
 - a. Prime Coat: Rust-inhibitive: Pro Industrial Pro-Cryl Universal Primer, B66-310 Series.
 - 1) at 5.0 to 10 mils wet, 2.0 to 4.0 mils dry.
 - b. Intermediate Coat: Matching topcoat.
 - c. Topcoat: Pro Industrial Acrylic Coating, B66-650 Series, semigloss.
 - 1) at 2.5 to 4.0 mils dry, per coat.
- P. Galvanized-Metal Ductwork Substrates:
1. The Sherwin-Williams Company.
 - a. 1 coat of Pro Industrial Pro-Cryl Universal WB Acrylic Primer.
 - b. 2 coats Pro Industrial Waterborne Acrylic Dryfall.
- Q. Aluminum (Not Anodized or Otherwise Coated) Substrates:
1. The Sherwin-Williams Company.
 - a. Prime Coat: Rust-inhibitive: Pro Industrial Pro-Cryl Universal Primer, B66-310 Series.
 - 1) at 5.0 to 10 mils wet, 2.0 to 4.0 mils dry.
 - b. Intermediate Coat: Matching topcoat.
 - c. Topcoat: Pro Industrial Acrylic Coating, B66-650 Series, semigloss.
 - 1) at 2.5 to 4.0 mils dry, per coat.
- R. Gypsum Board Wall Substrates – Latex System:
1. The Sherwin-Williams Company.
 - a. Prime Coat: ProMar 200 Zero VOC Latex Primer, B28W2600.
 - 1) at 4.0 mils wet, 1.0 mils dry.
 - b. Intermediate Coat: Matching topcoat.
 - c. Topcoat: ProMar 200 Zero VOC Latex, B20-2600 Series, eggshell.
 - 1) at 4.0 mils wet, 1.7 mils dry, per coat.
 2. The Sherwin-Williams Company. (For gyms, Corridors, cafeterias, and toilets).
 - a. Prime Coat: ProMar 200 Zero VOC Latex Primer, B28W2600.
 - 1) at 4.0 wet, 1.0 mils dry.
 - b. Intermediate Matching topcoat.
 - c. Topcoat: Pro Industrial Pre-Catalyzed Water Based Epoxy, K45-1151 Series, eggshell.
 - 1) at 4.0 mils wet, 1.5 mils dry, per coat.
- S. Gypsum Board Wall Substrates – Epoxy: Refer to Section 099600.
1. The Sherwin-Williams Company
 - a. 1 coat ProMar 200 Zero VOC Interior Latex Primer.
 - b. 1 coat ProMar 200 Zero VOC, eggshell.
 2. The Sherwin-Williams Company.
 - a. Roman Adhesives.
 - 1) 1 coat Pro-977 Ultra Prime.
- T. Wood Doors (Existing):
1. The Sherwin-Williams Company.
 - a. Fill damaged areas and sand smooth.
 - b. Prime Coat: PrepRite ProBlock Int./Ext. Latex Primer-Sealer, B51-600 Seireat 4.0 mils wet, 1.4 mils dry.
 - 1) at 4.0 mils wet, 1.4 mils dry.
 - c. Intermediate Coat: Matching topcoat.
 - d. Topcoat: Pro Industrial Acrylic Semi-Gloss Coating, B66-650 Series.
 - 1) at 2.5 to 4.0 mils dry, per coat.
- U. Wood Trim and Decorative Paneling (Opaque Finish):

END OF SECTION 099123

SECTION 099300 - STAINING AND TRANSPARENT FINISHING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and application of wood stains and transparent finishes on the following substrates:
 - 1. Interior Substrates:
 - a. Dressed lumber (finish carpentry or woodwork).
 - b. Wood-based panel products.
- B. Related Requirements:
 - 1. Section 012300 "Alternates" for those alternates affecting work of this Section.
 - 2. Section 096466 "Wood Athletic Flooring" for finishing system for wood gym flooring.
 - 3. Section 099123 "Interior Painting" for stains and transparent finishes on concrete floors.
 - 4. Section 099600 "High-Performance Coatings" for transparent high-performance coatings on concrete floors and clay masonry.

1.2 DEFINITIONS

- A. Gloss Level 3 "Eggshell": 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 4 "Satin-like": 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 5 "Semi-gloss": 35 to 70 units at 60 degrees, according to ASTM D 523.
- D. Gloss Level 6 "Gloss": 70 to 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Indicate VOC content.
- B. Samples for Initial Selection: Where colors are not specifically indicated, submit for each type of product.
- C. Samples for Verification: For each type of finish system and in each color and gloss of finish required.
 - 1. Submit Samples on representative samples of actual wood substrates, 8 inches square.
 - a. Apply finish to half of sample.
 - 2. Apply coats on Samples in steps to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
 - 5. Refer to Section 064023 "Interior Architectural Woodwork" for sample requirements of Learning Stair and Bench.
- D. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas.
 - 2. Use same designations indicated on Drawings and in schedules.
 - 3. Include color designations.
 - 4. VOC content.

1.4 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. Stains and Transparent Finishes: 1 gallon of each material and color applied.

1.5 QUALITY ASSURANCE

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

1.6 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.
 1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply finishes only when temperature of surfaces to be finished and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply finishes when relative humidity exceeds 85 percent, at temperatures less than 5 deg F above the dew point, or to damp or wet surfaces.
- C. Do not apply exterior finishes in snow, rain, fog, or mist.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products from one of the following, unless specified otherwise.
 1. Benjamin Moore & Co.
 2. Bona
 3. Glidden Professional.
 4. PPG Paints.
 5. The Sherwin-Williams Company.
- B. Products: Subject to compliance with requirements, provide one of the products listed in wood finish systems schedules for the product category indicated.

2.2 MATERIALS, GENERAL

- A. Material Compatibility:
 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, products shall be recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
 3. To the best extent possible, provide products from a single manufacturer.

- B. Stain Colors: As selected by Architect from manufacturer's full range.
 - 1. Intent is to match color of existing woodwork.
- C. Keynote Designations:
 - 1. Transparent Finish (Natural): (099300.A01).
 - 2. Transparent Finish (Stained): (099300.A02).
- D. Material Finish Schedule designations: "**ST1**"
- E. Paint Systems: Refer to schedule at end of this Section.

2.3 WOOD FILLERS

- A. Wood Filler Paste: MPI #91, as recommended by topcoat manufacturer.

2.4 STAINS

- A. Stain, Interior:
 - 1. Benjamin Moore & Co.
 - a. 1 coat Lenmar 1AS.12XX.
 - 2. Glidden Professional.
 - a. 1 coat Varathane Interior Wood Stain.
 - 3. PPG Paints.
 - a. 1 coat DEFT Interior Wood Stain.
 - 1) 1 coat DEFT Water-Based Interior Wood Stain.
 - 4. The Sherwin-Williams Company.
 - a. 1 coat Wood Classics Interior Wood Stain or Minwax 250 Wood Stain.
 - 1) For Birch, Maple, and White Oak species, apply Pre-Stain Wood Conditioner by Minwax prior to stain application.

2.5 ACRYLIC POLYURETHANE FINISH SYSTEMS

- A. Interior, Acrylic Polyurethane
 - 1. Benjamin Moore.
 - a. 1 coat sealer, Benwood, "Stays Clear" acrylic polyurethane.
 - b. 2 coats Benwood, "Stays Clear" acrylic polyurethane.
 - 2. Bona.
 - a. 1 coat sealer as recommended by topcoat manufacturer.
 - b. 2 coats Bona Traffic HD

2.6 POLYURETHANE VARNISHES

- A. Varnish, Interior, Polyurethane, Waterborne, Satin (Gloss Level 4):
 - 1. Benjamin Moore & Co.
 - a. 2 coats
 - 2. Glidden Professional.
 - a. 2 coats Varathane Interior WB Polyurethane.
 - 3. PPG Paints.
 - a. 2 coats DEFT Interior WB Polyurethane.
 - 1) 2 coats DEFT Interior Water-Based Polyurethane
 - 4. The Sherwin-Williams Company.
 - a. 2 coats Wood Classics Waterborne Polyurethane Varnish.
- B. Varnish, Exterior, Polyurethane, Oil-Modified, Satin:
 - 1. Benjamin Moore & Co.
 - a. 2 coats Lenmar 1V.109 Spar Varnish
 - 2. Glidden Professional.

- a. 1 coat ProLux (Sikkens) Cetol 1 RE .
 - b. 2 coats ProLux (Sikkens) Cetol 23 Plus RE.
 - 1) 1 coat ProLux Cetol WB SRD
 - 2) Color and Gloss to be selected by Architect and Owner from manufacturer's full range.
- 3. PPG Paints.
 - a. 1 coat ProLux (Sikkens) Cetol 1 RE.
 - b. 2 coats ProLux (Sikkens) Cetol 23 Plus RE.
 - 1) 1 coat ProLux Cetol WB SRD
 - 2) Color and Gloss to be selected by Architect and Owner from manufacturer's full range.
- 4. The Sherwin-Williams Company.
 - a. 2 coats WoodScapes Exterior Semi-Transparent Polyurethane Stain.

2.7 FIRE RETARDANT COATING

- A. Fire Retardant Water-based Primer:
 - 1. Flame Stop II by Flame Stop.
 - 2. PPG Paints; "42-7 Speedhide Class "A" Fire Retardant.

2.8 SOURCE QUALITY CONTROL

- A. Testing of Materials: Owner reserves the right to invoke the following procedure:
 - 1. Owner will engage the services of a qualified testing agency to sample wood finishing materials. Contractor will be notified in advance and may be present when samples are taken. If materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 - 2. Testing agency will perform tests for compliance with product requirements.
 - 3. Owner may direct Contractor to stop applying wood finishes if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying materials from Project site, pay for testing, and refinish surfaces finished with rejected materials. Contractor will be required to remove rejected materials from previously finished surfaces before refinishing with complying materials if the two finishes are incompatible or produce results that, in the opinion of the Architect, are aesthetically unacceptable.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Exterior Wood Substrates: 15 percent, when measured with an electronic moisture meter.
- C. Maximum Moisture Content of Interior Wood Substrates: 10 percent, when measured with an electronic moisture meter.
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- E. Proceed with finish application only after unsatisfactory conditions have been corrected.
 - 1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.

1. After completing finishing operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each substrate condition and as specified.
1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
 2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.
- D. Exterior Wood Substrates:
1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 2. Prime edges, ends, faces, undersides, and backsides of wood.
 - a. For solid hide stained wood, stain edges and ends after priming.
 - b. For varnish-coated stained wood, stain edges and ends and prime with varnish. Prime undersides and backsides with varnish.
 3. Countersink steel nails, if used, and fill with putty or plastic wood filler tinted to final color. Sand smooth when dried.
- E. Interior Wood Substrates:
1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 2. Apply wood filler paste to open-grain woods, as defined in "MPI Architectural Painting Specification Manual," to produce smooth, glasslike finish.
 3. Sand surfaces exposed to view and dust off.
 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dry.

3.3 APPLICATION

- A. Apply finishes according to coating manufacturer's written instructions and recommendations.
1. Use applicators and techniques suited for finish and substrate indicated.
 2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.
 3. Do not apply finishes over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

3.4 CLEANING AND PROTECTION

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

3.5 EXTERIOR WOOD-FINISH-SYSTEM SCHEDULE

- A. Exterior Glulam Structure:
1. PPG Paints
 - a. 2 coats ProLuxe (Sikkens) Cetol 1 RE.
 - b. 2 coats ProLuxe (Sikkens) Cetol 23 Plus RE.
 - 1) 1 coat ProLuxe Cetol WB SRD

3.6 INTERIOR WOOD -FINISH-SYSTEM SCHEDULE

- A. Stained Millwork:
 - 1. 1 coat stain.
 - 2. 2 coats polyurethane varnish.
- B. Wood substrates, non-traffic vertical surfaces:
 - 1. 1 coat stain.
 - 2. 2 coats polyurethane varnish.
- C. Wood substrates, non-traffic vertical surfaces (Fire-Retardant):
 - 1. 1 coat Flame II fire retardant treatment.
 - 2. 1 coat water-based stain.
 - 3. 2 coats water-based polyurethane varnish.
- D. Wood substrates, non-traffic horizontal surfaces:
 - 1. 1 coat stain.
 - 2. 1 intermediate coat (thinned to 10 percent reduction) polyurethane varnish.
 - 3. 2 topcoats polyurethane varnish.
- E. Varnish, Interior, Polyurethane, Oil-Modified, Satin (Gloss Level 4):
 - 1. WoodClassics Polyurethane Varnish.
- F. Varnish, Interior, Polyurethane, Waterborne, Satin (Gloss Level 4):
 - 1. WoodClassics Waterborne Polyurethane Varnish.
- G. Wood substrates, nontraffic and traffic horizontal surfaces of Learning Stair and Benches:
 - 1. General: Finish shall be a complete system from a single manufacturer.
 - 2. Apply 3 coats of sealer.
 - 3. Apply 2 coats of topcoat.

END OF SECTION 099300

SECTION 099600 - HIGH PERFORMANCE COATINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of high-performance coating systems on the following substrates:
 - 1. Exterior Substrates:
 - a. Steel.
 - b. Galvanized metal.
 - c. Aluminum (not anodized or otherwise coated).
 - 2. Interior Substrates:
 - a. Concrete masonry units (CMUs).
 - b. Steel.
 - c. Galvanized metal.
 - d. Aluminum (not anodized or otherwise coated).
 - e. Gypsum board.
 - f. Plaster.
- B. Related Requirements:
 - 1. Section 012100 "Allowances" for those allowances affecting work of this Section.
 - 2. Section 012200 "Unit Prices" for unit prices affecting work of this Section.
 - 3. Section 099123 "Interior Painting" for general field painting.

1.2 DEFINITIONS

- A. Gloss Level 3 "Eggshell": 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 5 "Semi-gloss": 35 to 70 units at 60 degrees, according to ASTM D 523.
- C. Gloss Level 6 "Gloss": 70 to 85 units at 60 degrees, according to ASTM D 523.
- D. Gloss Level 7 "High Gloss": More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Indicate VOC content.
- B. Samples for Initial Selection: For each type of topcoat product indicated.
- C. Samples for Verification: For each type of coating system and each color and gloss of topcoat indicated.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Apply coats on Samples in steps to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
 - 1. Cross-reference to coating system and locations of application areas.
 - 2. Use same designations indicated on Drawings and in schedules.
 - 3. Color designations.

1.4 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. Coatings: One (1) gallon of each material and color applied.

1.5 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.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.6 FIELD CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
- C. Do not apply exterior coatings in snow, rain, fog, or mist.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers - Basis of Design Products: Subject to compliance with requirements, provide products by The Sherwin-Williams Company, or comparable products from other manufacturers submitted to and accepted by Architect and Owner prior to bidding.

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

- A. Material Compatibility:
 - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
 - 3. Products shall be of same manufacturer for each coat in a coating system.
- B. VOC Content: For field applications, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits for paints and paint colorants:
 - 1. Paints and Coatings: Less than 50 g/L.
- C. Low-Emitting Materials: For field applications that are inside the weatherproofing system, 90 percent of paints and coatings shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- D. Colors: Where not indicated on Drawings, as selected by Architect from manufacturer's full range.
- E. Paint Systems: Refer to schedule at end of this Section.
- F. Material Finish Legend designations:
 - 1. Wall & Ceiling Finishes: 099600.A01, finishes "**HP1 - HP7.**"

2.3 SOURCE QUALITY CONTROL

- A. Testing of Coating Materials: Owner reserves the right to invoke the following procedure:
 - 1. Owner may engage the services of a qualified testing agency to sample coating materials. Contractor will be notified in advance and may be present when samples are taken. If coating materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 - 2. Testing agency will perform tests for compliance with product requirements.
 - 3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Fiber-Cement Board: 12 percent.
 - 3. Masonry (Clay and CMUs): 12 percent.
 - 4. Wood: 15 percent.
 - 5. Gypsum Board: 12 percent.
 - 6. Plaster: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Plaster Substrates: Verify that plaster is fully cured.
- E. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- F. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions applicable to substrates and paint systems indicated.
 - 1. Prepare previously painted surfaces indicated to receive new paint finish in strict accordance with paint manufacturer's written recommendations.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.
- D. Concrete Substrates: Remove all surface contamination such as release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
 - 1. Clean concrete by one of the following methods as recommended by paint manufacturer:

- a. Clean surfaces with pressurized water. Use pressure range of 1500 to 4000 psi at 6 to 12 inches.
 - b. Abrasive blast clean surfaces to comply with SSPC-SP 7/NACE No. 4.
- 2. Verify that chemical removal agents (if used) have been neutralized prior to installation of paint products.
- E. Masonry Substrates: Remove all surface contamination such as oil, grease, loose paint, mill scale, dirt, foreign matter, rust, mold, mildew, mortar, efflorescence and sealers. Wash surfaces with an abrasive cleanser and dull in one operation, or wash thoroughly and dull by sanding. Spot prime any bare areas with an appropriate primer.
 - 1. Do not coat surfaces if moisture content, alkalinity of surfaces, or alkalinity of mortar joints exceeds that permitted in manufacturer's written instructions.
 - 2. Clean surfaces with pressurized water. Use pressure range of 100 to 600 psi at 6 to 12 inches.
- F. Existing Pre-Painted CMU Substrates: Clean and prepare as recommended by coating manufacturer.
- G. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer.
- H. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- I. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.
- J. Aluminum Substrates: Remove loose surface oxidation.

3.3 APPLICATION

- A. Apply high-performance coatings according to manufacturer's written instructions.
 - 1. Use applicators and techniques suited for coating and substrate indicated.
 - 2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Coat backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.
- D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 FIELD QUALITY CONTROL

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

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

- B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from coating operation. Correct damage to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.6 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

- A. Galvanized Metals, Bollards and Trash Enclosure Framing:
 - 1. The Sherwin-Williams Company.
 - a. 1 coat Macropoxy 646.
 - b. 1 coat Pro Industrial WB Alkyd Urethane.
- B. Steel Substrates:
 - 1. The Sherwin-Williams Company.
 - a. 1 coat Macropoxy 646-100.
 - b. 1 coat FluoroKem HS.
- C. Previously Painted Exterior Railings and Handrails:
 - 1. The Sherwin-Williams Company.
 - a. Scuff sand to create profile and clean of all deleterious materials as recommended by topcoat manufacturer.
 - b. 1 coat Extreme Bond Primer
 - c. 1 coat Waterbased Acrolon 100 HS Acrylic Polyurethane. , semi-gloss.

3.7 INTERIOR HIGH-PERFORMANCE COATING SCHEDULE

- A. Exposed Structural Steel Columns and Framing:
 - 1. The Sherwin-Williams Company.
 - a. 1 coat Macropoxy 646-100.
 - b. 1 coat Waterbased Acrolon 100 HS Acrylic Polyurethane., semi-gloss.
- B. Steel Railings:
 - 1. The Sherwin-Williams Company.
 - a. 1 coat Macropoxy 646-100
 - b. 1 coat Waterbased Acrolon 100 HS Acrylic Polyurethane,semi-gloss
- C. Concrete and CMU Substrates - Epoxy System (non-wet walls):
 - 1. The Sherwin-Williams Company.
 - a. 1 coat Loxon Block Surfacers, 18 mils wet, 8 mils dry.
 - b. 2 coats Pro Industrial Pre-Catalyzed Waterbased Epoxy, 1150 Series, single-component,
 - 1) Eggshell
- D. Concrete and CMU Substrates - Epoxy System (wet areas):
 - 1. The Sherwin-Williams Company.
 - a. 1 coat Pro Industrial Heavy-Duty Block Filler.
 - b. 2 coats Pro Industrial Zero VOC Waterborne Catalyzed Epoxy, two-component,
 - 1) Eggshell
- E. Interior Metal:
 - 1. The Sherwin-Williams Company.
 - a. 1 coat Pro Industrial Pro-Cryl, universal water base primer.
 - b. 2 coats Pro Industrial Waterbase Alkyd Urethane; semi-gloss.
- F. Gypsum Board Wall Substrates – Epoxy:
 - 1. The Sherwin-Williams Company.
 - a. 1 coat ProMar 200 Zero VOC Interior Primer.

- b. 2 coats Pro Industrial Pre-Catalyzed Waterbased Epoxy, 1150 Series, single-component,
 - 1) Eggshell
- G. Gypsum Board Wall Substrates – Epoxy (wet areas):
 - 1. The Sherwin-Williams Company.
 - a. 1 coat ProMar 200 Zero VOC Interior Primer.
 - b. 2 coats Pro Industrial Zero VOC Waterborne Catalyzed Epoxy, two-component,
 - 1) Eggshell
- H. Gypsum Board Ceiling Substrates – Epoxy (wet areas):
 - 1. The Sherwin-Williams Company.
 - a. 1 coat Sherwin Williams Macropoxy 646-100.
 - b. 2 coats Pro Industrial Zero VOC Waterborne Catalyzed Epoxy, two-component,
 - 1) Eggshell
- I. Existing Tile Substrates and Existing Pre-Painted CMU Substrates:
 - 1. The Sherwin-Williams Company.
 - a. 1 coat Extreme Bond Primer.
 - b. 1 base coat Pro Industrial Pre-Catalyzed Waterbased Epoxy, 1150 Series, single-component, Eggshell
 - c. 2 coats Pro Industrial Zero VOC Waterborne Catalyzed Epoxy, two-component, Eggshell

END OF SECTION 099600

SECTION 101100 - VISUAL DISPLAY UNITS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Markerboards (101100.A02 - **MB1**).
 - 2. Visual Display Wall Panels (101100.A05 - **MB6**).
 - 3. Magnetic glass markerboards (101100.A10 - **GMB1**).
 - 4. Display Rails.
- B. Related Requirements:
 - 1. Section 012100 "Allowances" for those allowances affecting work of this Section.
 - 2. Section 012300 "Alternates" for those alternates affecting work of this Section.
 - 3. Section 097723 "Fabric-Wrapped Panels" for tackable, fabric-covered panels mounted on walls.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, finishes, and accessories for visual display units.
 - 2. Include electrical characteristics for motorized units.
- B. Shop Drawings: For visual display units.
 - 1. Include plans, elevations, sections, details, and attachment to other work.
 - 2. Show locations of panel joints. Show locations of field-assembled joints for factory-fabricated units too large to ship in one piece.
 - 3. Show locations and layout of special-purpose graphics.
 - 4. Include sections of typical trim members.
 - 5. Include wiring diagrams for power and control wiring.
 - 6. Show dimensioned layout and elevation of each area, indicate number of panels for each layout.
 - 7. Include illustrations of each type of mounting system.
- C. Samples for Initial Selection: For each type of visual display unit indicated, for units with factory-applied color finishes, and as follows:
 - 1. Samples of facings for each visual display panel type, indicating color and texture.
 - 2. Actual factory-finish color samples, applied to aluminum substrate.
 - 3. Include accessory Samples to verify color selected.
- 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, with facing, core, and backing indicated for final Work. Include one panel for each type, color, and texture required.
 - 2. Trim: 6-inch-long sections of each trim profile.
 - 3. Display Rail: 6-inch-long section of each type.
 - 4. Accessories: Full-size Sample of each type of accessory.
 - 5. Sample of magnetic glass write board in color specified, not less than 12 inches square. Include sample of one mounting device in finish selected.
 - 6. Sample of magnetic dry-erase board in color specified, not less than 12 inches square. Include sample of one mounting device.
- E. Product Schedule: For visual display units. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for surface-burning characteristics of tackboards.
- C. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For visual display units[and motorized units] to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver factory-fabricated visual display units completely assembled in one piece. If dimensions exceed maximum manufactured unit size, or if unit size is impracticable to ship in one piece, provide two or more pieces with joints in locations indicated on approved Shop Drawings.
- B. Deliver factory-built visual display surfaces, including factory-applied trim, completely assembled in one piece without joints, where possible. If dimensions exceed maximum manufactured panel size, provide two 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.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install visual display units 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.
- B. Field Measurements: Verify actual dimensions of construction contiguous with visual display units by field measurements before fabrication.
 - 1. Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.

1.9 WARRANTY

- A. Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer agrees to repair or replace porcelain-enamel face sheets that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Surfaces lose original writing and erasing qualities.
 - b. Surfaces exhibit crazing, cracking, or flaking.
 - 2. Warranty Period: Life of the building.
- B. Special Warranty for Glass Markerboard Panels: Manufacturer agrees to repair or replace glass markerboard panels that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Surfaces lose original writing and erasing qualities.
 - 2. Warranty Period: 10 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of visual display unit from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 450 or less.
- B. 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.

2.3 MARKERBOARD ASSEMBLIES

- A. Porcelain-Enamel Markerboards (101100.A02 – MB1): Balanced, high-pressure, factory-laminated markerboard assembly of three-ply construction consisting of backing sheet, core material, and porcelain-enamel face sheet. Units shall be 4'-0" tall, unless otherwise indicated on Drawings.
 - 1. Basis of Design: Subject to compliance with requirements, provide Claridge, Inc.; "Series 4" markerboards or one markerboards of the following manufacturers meeting the specified product characteristics:
 - a. Marsh by PolyVision.
 - 2. MDF Core: 7/16 inch thick; with 0.005 inch thick, aluminum foil backing.
 - 3. Laminating Adhesive: Manufacturer's standard, moisture-resistant thermoplastic type.
 - 4. Writing Surface: Low Gloss Porcelain Enamel Steel surface recommended by manufacturer for projections.
 - a. Basis of Design: "LCS3" by Claridge Products.
 - 1) Color: White #100.
 - b. Maintenance: Manufacturer's cleaning recommendations shall allow the use of non-proprietary cleaners and shall include instructions for removal of permanent markers.
 - 5. Frames: Fabricated from not less than 0.062 inch thick, extruded aluminum; 5/8-inch inch flat style trim with mitered corners; factory applied.
 - a. Color: Satin Anodized Aluminum.
 - 6. Markertray: Manufacturer's standard, continuous:
 - a. Solid Type: Extruded aluminum with ribbed section and smoothly curved exposed ends.
 - 7. Map Rail: Provide the following accessories:
 - a. Display Rail: Continuous and integral with map rail; fabricated from cork approximately 1 to 1-1/2 inches wide with two map clip.
 - b. End Stops: Located at each end of map rail.

2.4 VISUAL DISPLAY WALL PANELS (101100.A05 - MB6)

- A. Floor-to-Ceiling Markerboard Panel Assemblies: Consisting of markerboard panels with porcelain-enamel facing on core indicated, fabricated for floor-to-ceiling assemblies.
 - 1. Basis of Design: Subject to compliance with requirements, provide "LCS Marker Wall" by Claridge Products or one of the following manufacturers meeting the specified product characteristics:
 - a. Marsh by PolyVision.
 - 2. Color: As indicated on Material Finish Legend on drawings.
 - 3. Writing Surface: Low Gloss Porcelain Enamel Steel surface recommended by manufacturer for projections. Basis of Design: "LCS3" by Claridge Products.
 - a. Color: White
 - b. Maintenance: Manufacturer's cleaning recommendations shall allow the use of non-proprietary cleaners and shall include instructions for removal of permanent markers.
 - c. Magnetic Surface: Writing surface shall be magnetic and compatible with standard magnetic document fastening products.

4. Width: As indicated on Drawings.
5. Height: As indicated on Drawings.
6. Joint Accessories: Manufacturer's standard, concealed aluminum spline at butt joints.

2.5 MAGNETIC GLASS MARKER BOARDS (101100.A10 - GMB1)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Claridge "Magnetic Dry Erase Markerboards" or comparable products meeting specified requirements from manufacturer listed below or from other manufacturers submitted to and approved by Architect prior to bidding.
 1. Carvart Contract; glassBOARDS."
 2. Clarus; "Glassboard Float."
 3. HighTower Group LLC; "Chat-Board."
 4. Peter Pepper Products; "Tactics" Glass Writing Surface.
 5. Square One Studio; "Magnetic Glass Markerboard".
- B. Magnetic glass write board models include:
 1. Standard boards: Provide Model MGMI in sizes indicated on Drawings.
- C. Product Description:
 1. Glass for boards shall be produced from recycled glass fragments and sand.
 2. Metal backing shall be powder-coat finished.
- D. Product Characteristics:
 1. Sizes: As indicated.
 2. Colors: As selected by Architect from manufacturer's full range of standard colors.
- E. Accessories: Provide the following additional accessories:
 1. Dry Erase Marker Set CB170W – Black markers with Silver Rare Earth Magnets. Set of 12 markers with steel coil attached to the marker.
 2. Magnetic Erasers: Manufacturer's standard black magnetic erasers – CB 180. Provide one eraser for each MB.
 3. Magnets: Manufacturer's standard, silver disk "Rare Earth" magnets, provide 1 package of 12 for each MB.
 4. Mounting accessories: Provide each magnetic glass write board with manufacturer's standard mechanical fasteners and hanging rail. Provide fasteners suitable to wall substrate.

2.6 MARKERBOARD SURFACING (101100.A14)

- A. Porcelain-Enamel Markerboard Surfacing (101100.A05): Porcelain-enamel face sheet.
 1. Adhesive: Manufacturer's standard, moisture-resistant thermoplastic type.
 2. Writing Surface: Low Gloss Porcelain Enamel Steel surface recommended by manufacturer for projections.
 - a. Basis of Design: "LCS3" by Claridge Products.
 - b. Color: White #100.
 - c. Maintenance: Manufacturer's cleaning recommendations shall allow the use of non-proprietary cleaners and shall include instructions for removal of permanent markers.
 - d. Magnetic Surface: Writing surface shall be magnetic and compatible with standard magnetic document fastening products.
 3. Writing Surface: High Gloss Porcelain Enamel Steel surface recommended by manufacturer for projections.
 - a. Basis of Design: "LCS3HG" by Claridge Products.
 - b. Color: White.
 - c. Maintenance: Manufacturer's cleaning recommendations shall allow the use of non-proprietary cleaners and shall include instructions for removal of permanent markers.
 - d. Magnetic Surface: Writing surface shall be magnetic and compatible with standard magnetic document fastening products.

2.7 MATERIALS

- A. Adhesives for Field Application: Mildew-resistant, nonstaining adhesive for use with specific type of panels, sheets, or assemblies; and for substrate application; as recommended in writing by visual display unit manufacturer.

1. Adhesives shall have a VOC content of 50 g/L or less.
- B. Clear Tempered Glass: ASTM C 1048, Kind FT, Condition A, Type I, Class 1, Quality Q3, with exposed edges seamed before tempering.
- C. Extruded Aluminum: ASTM B 221, Alloy 6063.
- D. Fiberboard: ASTM C 208 cellulosic fiber insulating board.
- E. Hardboard: ANSI A135.4, tempered.
- F. High-Pressure Plastic Laminate: NEMA LD 3.
- G. Natural-Cork Sheet: Seamless, single-layer, compressed fine-grain cork sheet; bulletin board quality; face sanded for natural finish with surface-burning characteristics indicated.
- H. Medium-Density Fiberboard: ANSI A208.2, Grade 130.
- I. Particleboard: ANSI A208.1, Grade M-1.
- J. Polyester Fabric: Nondirectional weave, 100 percent polyester; weighing not less than 15 oz./sq. yd.; with surface-burning characteristics indicated.
- K. Porcelain-Enamel Face Sheet: PEI-1002, with face sheet manufacturer's standard two- or three-coat process.
- L. Vinyl Fabric: Mildew resistant, washable, complying with FS CCC-W-408D, Type II, [burlap weave] ; weighing not less than 13 oz./sq. yd.; with surface-burning characteristics indicated.

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. 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 unacceptable. 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. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of the Work.
- B. Examine roughing-in for electrical power systems to verify actual locations of connections before installation of motorized, sliding visual display units.
- C. Examine walls and partitions for proper preparation and backing for visual display units.
- D. Examine walls and partitions for suitable framing depth where sliding visual display units will be installed.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates of substances, such as dirt, mold, and mildew, that could impair the performance of and affect the smooth, finished surfaces of visual display boards.
- C. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, projections, depressions, and substances that will impair bond between visual display units and wall surfaces.
- D. Prepare recesses for sliding visual display units as required by type and size of unit.

3.3 INSTALLATION OF FACTORY-FABRICATED VISUAL DISPLAY BOARDS AND ASSEMBLIES

- A. Visual Display Boards: Attach concealed clips, hangers, and grounds to wall surfaces and to visual display boards with fasteners at not more than 16 inches o.c. Secure both top and bottom of boards to walls. Do NOT adhesively apply visual display boards to wall substrates.

3.4 INSTALLATION OF FRAMELESS MARKERBOARD SYSTEM

- A. General: Install in strict accordance with markerboard system manufacturer's written instructions. Securely attach mounting brackets to wall surfaces to configuration indicated for each installation area. Secure with mechanical fasteners.

3.5 INSTALLATION OF MAGNETIC GLASS WRITE BOARDS

- A. General: Install in strict accordance with magnetic glass write board manufacturer's written instructions. Attach using manufacturer's concealed system to wall surfaces. Utilize mechanical fasteners appropriate for wall surface and type as occurs. Do NOT adhesively apply magnetic glass write boards to wall substrates.

3.6 INSTALLATION OF FLOOR TO CEILING MARKERBOARD PANELS

- A. Floor-to-Ceiling Markerboard Panels: Attach panels to wall surface with egg-size adhesive gobs at 16 inches o.c., horizontally and vertically.
 - 1. Join adjacent panels with concealed steel splines for smooth alignment.

3.7 CLEANING AND PROTECTION

- A. Clean visual display units 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 units after installation and cleaning.

3.8 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain motorized, sliding visual display units.

END OF SECTION 101100

SECTION 101423 - ADA AND CODE SIGNAGE

PART 1 GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Wayfinding Panel Signage (101423.A01):
 - a. Interior Room signage.
 - b. Custom fabricated polymer plastic signage.
- B. Related Sections include the following:
 - 1. Section 012100 "Allowances" for interior room signage and exterior door signage.
 - 2. Section 015000 "Temporary Facilities and Controls" for temporary Project identification signs and for temporary information and directional signs.
 - 3. Section 101400 "Signage" for related graphics and signage.
 - 4. Division 26 Section "Interior Lighting" and "Exterior Lighting" for illuminated signs.

1.2 DEFINITIONS

- A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."
- B. Signage Contractor: Contractor responsible for the fabrication and installation of signage unless responsibility for fabrication or installation is called out by others in the drawings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Including but not limited to, the following:
 - 1. Manufacturer's technical product data for each type of product specified. Include data on physical characteristics, durability, fade resistance, flame resistance and manufacturing process.
 - 2. Product data shall show compliance with requirements for fire performance characteristics and physical properties.
- B. Shop Drawings: Show fabrication and installation details for signs.
 - 1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 2. Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each sign.
 - 3. Include fabrication and installation details, and attachments to other work.
 - 4. Include elevations, component details, and attachments to other work for wayfinding signage.
 - 5. Indicate materials and profiles of signage fittings, joinery, finishes, fasteners, anchorages, and accessory items.
 - 6. Field Dimensions shall be obtained, reviewed, and accepted by signage manufacturer prior to submittal of shop drawings.
- C. Samples for Initial Selection: Manufacturer's color charts consisting of actual units or sections of units showing the full range of colors available for the following:
 - 1. Aluminum.
- D. Samples for Verification:
 - 1. Sample from same flitch to be used for the Work, with specified finish applied.
 - 2. Submit full-size samples of wayfinding signage. Quantity and type shall be determined by Architect with intent of one sample per each signage type representative of all types of products indicated.
- E. Sign Schedule: Use same designations indicated on Drawings.

- F. Mockups/Field Samples: Build mockups/field samples to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Warranty: Special warranty specified in this Section.
- C. Provide written documentation that the braille translation included on the manufacturer's signage provided in this section has been evaluated by the American Foundation for the Blind, and is, in their opinion, correct and compliant with ADAAG.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Fabricator Qualifications: A firm that employs skilled workers experienced in producing custom-fabricated products similar to those required for this Project and with at least seven years continuous experience under the current company name. Fabricator shall have a record of successful in-service performance, as well as sufficient production capacity to produce required units.
 - 1. Fabricator shall have completed at least seven (7) similar signage projects having similar requirements within the last four (4) years for each signage type.
- C. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.
- D. Regulatory Requirements: Comply with applicable provisions in ICC A117.1.
- E. Fire Performance Characteristics: Provide wall coverings with the following surface burning characteristics as determined by testing identical products per ASTM E 84 by UL or other testing and inspecting organizations acceptable to authorities having jurisdiction. Identify wall coverings with appropriate markings of applicable testing and inspecting organization.
 - 1. Flame Spread: 5 or less.
 - 2. Smoke Developed: 25 or less.
- F. Accessibility Guidelines: Signage shall comply with ICC A117.1 where applicable. Characters and graphics, including but-not limited to, copy height, letter stroke symbols, materials, and finishes indicated on the Drawings are intended as guidelines for compliance. Implement each applicable ADA guideline. Should conflicts arise, notify the Designer before proceeding.

1.7 PREINSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site.
 - 1. Required parties include the contractor, sub-contractor and architect/designer.
 - 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 3. Review temporary protection requirements for during and after installation.

1.8 PROJECT CONDITIONS

- A. Weather Limitations for Exterior Signage: Proceed with installation only when existing and forecasted weather conditions permit installation of signs in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.
- B. Interior Environmental Limitations: Do not deliver and install vinyl wall graphics until spaces are enclosed and weathertight, wet work in spaces to receive murals is complete and dry, work above ceilings is complete, and temporary or permanent HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
 - 1. Maintain a constant temperature not less than 60 deg F in installation areas for at least 10 days before and 10 days after installation.
- C. Lighting: Do not install vinyl wall graphics until permanent level of lighting is provided on the surfaces to receive murals.
- D. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by the vinyl wall graphics manufacturer for full drying and curing.
- E. Field Measurements: Verify recess openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install ADA and Code Signage 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 for not less than 72 hours before beginning installation and for the remainder of the construction period.

1.10 DELIVERY, STORAGE AND HANDLING

- A. Use special care in handling to prevent twisting, warping, nicking, and other damage to signage. Store materials to permit easy access for inspection and identification.
- B. Store signage in a well-ventilated area, away from uncured concrete and masonry, and protected from weather, moisture, soiling, abrasion, extreme temperatures, and humidity.

1.11 COORDINATION

- A. Coordinate placement of anchorage devices with templates for installing signs.
- B. For signage 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.

1.12 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of metal and polymer finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image colors.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for signs.

2.2 MATERIALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. Provide materials without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. 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.
 - 1. Plate and Sheet: ASTM B 209, Alloy 3003-H14, Alloy 5005-H32 or Alloy 6061-T6.
 - 2. Castings: ASTM B 26/B 26M, of alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated.
 - 3. Extrusions: ASTM B221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- C. Acrylic Sheet: ASTM D 4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).
- D. PETG (Polyethylene Terephthalate Glycol) Sheet: ASTM D 5047-17 category as standard with manufacturer for each sign.
 - 1. Tensile Strength: 7,700 lbf/sq. in. per ASTM D 638.
 - 2. Flexural Modulus of Elasticity: 310,000 lbf/sq. in. per ASTM D 790.
- E. Photopolymer Sheet: Manufacturer's recommended photopolymer for producing integral non-laminated raised copy.
- F. Polycarbonate Sheet: Of thickness indicated, manufactured by extrusion process, ASTM C 1349, Appendix X1, Type II (coated, mar-resistant, UV-stabilized polycarbonate), coated on both surfaces with abrasion-resistant coating:
 - 1. Impact Resistance: 16 ft-lbf/in. per ASTM D 256, Method A.
 - 2. Tensile Strength: 9000 lbf/sq. in. per ASTM D 638.
 - 3. Flexural Modulus of Elasticity: 340,000 lbf/sq. in. per ASTM D 790.
 - 4. Heat Deflection: 265 deg F at 264 lbf/sq. in. per ASTM D 648.
 - 5. Abrasion Resistance: 1.5 percent maximum haze increase for 100 revolutions of a Taber abraser with a load of 500 g per ASTM D 1044.
- G. Expanded PVC Sheet: Subject to compliance with requirements, provide "Sintra" by 3A Composites.
 - 1. Material: Moderately expanded closed-cell polyvinyl chloride.
 - 2. Color: As selected by Architect from manufacturer's full range.
- H. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

2.3 FINISHES

- 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.

D. Aluminum Finishes

1. Clear Anodic Finish: Manufacturer's standard Class 1 clear anodic coating, 0.018 mm or thicker, over a satin (directionally textured) mechanical finish, complying with AAMA 611.

E. Acrylic Sheet Finishes

1. Colored Coatings for Acrylic Sheet: For copy and background colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and that are UV and water resistant for five years for application intended.

2.4 ACCESSORIES

- A. Mounting Methods: Use double sided vinyl tape and silicone adhesive fabricated from materials that are not corrosive to sign materials and mounting surface.

- B. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

1. Use concealed fasteners and anchors unless indicated to be exposed.
2. Exposed Metal-Fastener Components, General:
 - a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
 - b. Fastener Heads: For nonstructural connections, use oval countersunk screws and bolts with tamper-resistant, Allen-head slots unless otherwise indicated.

2.5 FABRICATION

- A. General: Provide manufacturer's standard signs of configurations indicated.

1. Mill joints to tight, hairline fit. Form joints exposed to weather to exclude water penetration.
2. Preassemble signs in the shop to greatest extent possible. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in location not exposed to view after final assembly.
3. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.
4. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.

- B. Sign Message Panels: Construct sign-panel surfaces to be smooth and to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch (1.5 mm) measured diagonally from corner to corner.

1. Increase panel thickness or reinforce with concealed stiffeners or backing materials as needed to product surfaces without distortion, buckles, warp, or other surface deformations.

2.6 WAYFINDING PANEL SIGNAGE – ROOM SIGNAGE (101423.A01)

- A. General: Panel signs shall be acrylic or photopolymer signs with insert window, with an overall thickness of approximately 5/16 inch. Existing signs were constructed as follows:

1. Provide back sheet of 1/8 inch thick acrylic with first surface painted.
2. Provide 1/16 inch spacer for insert window.
3. Provide 1/8 inch thick photopolymer with first surface painted.
4. Provide painted edges for solid appearance.
5. Provide white raised numbers and braille, unless otherwise indicated or required by code.

- B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Ad Trends.
2. APCO Signs.
3. ASI Sign Systems, Inc.
4. Fast Signs.
5. Gemini.
6. Howard Industries.

7. Innerface Architectural Signage, Inc.
 8. Modulex.
 9. Nova Polymers.
 10. Star Signs.
 11. Take Form.
 12. 2/90 Sign Systems.
- C. Interior Panel Signs: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner.
 - D. Changeable Message Inserts: Fabricate signs to allow insertion of changeable messages in the form of slide-in inserts.
 - E. Tactile and Braille Sign: Manufacturer's standard process for producing text and symbols complying with ADA-ABA Accessibility Guidelines and with 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; Braille dots with domed or rounded shape.
 1. Raised-Copy Thickness: Not less than 1/32 inch.
 - F. Subsurface Copy: Apply minimum 4-mil- thick vinyl copy to back face of clear acrylic sheet forming panel face to produce precisely formed opaque image. Image shall be free of rough edges.
 - G. Colored Coatings for Acrylic Sheet: For copy background colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and are UV and water resistant for five years for application intended.
 1. Color: As selected by Architect from manufacturer's full range.
 - H. Sign Types – General: There will be one type with tactile/Braille to match existing interior signage to best extent possible as acceptable to Architect.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Verify that sign-support surfaces are within tolerances to accommodate signs.
- C. Verify that anchor inserts are correctly sized and located to accommodate signs.
- D. Verify that items provided under other sections of Work are sized and located to accommodate signs.
- E. Examine supporting members to ensure that surfaces are at elevations indicated or required to comply with authorities having jurisdiction and are free from dirt and other deleterious matter.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.
- G. Field verify dimensions of all conditions.

3.2 INSTALLATION, GENERAL

- A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.
 1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
 2. Interior 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 inches of sign without encountering protruding objects or standing within swing of door.

- B. Wall-Mounted Signs Mounted on Glass: Provide opaque sheet matching sign material and finish onto opposite side of glass to conceal back of sign.
- C. Wall-Mounted Signs on Smooth Surfaces: Comply with sign manufacturer's written instructions except where more stringent requirements apply.
 - 1. Silicone-Adhesive Mounting: Attach signs to irregular, porous, or vinyl-covered surfaces. Where signage is located on exterior surfaces, provide exterior rated adhesive as recommended by signage manufacturer for substrate indicated.
- D. Wall-Mounted Signs on Textured Surfaces: Comply with sign manufacturer's written instructions except where more stringent requirements apply. Mount characters using standard fastening methods to comply with manufacturer's written instructions for character form, type of mounting, wall construction, and condition of exposure indicated. Provide heavy paper template to establish character spacing and to locate holes for fasteners.
 - 1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
 - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
 - b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
- E. Vertical Tolerance: Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1m)

3.3 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.
- B. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes to components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- C. Remove temporary protective coverings and strippable films as signs are installed.
- D. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean conditions during construction and protect from damage until acceptance by Owner.

END OF SECTION 101423

This page intentionally left blank

SECTION 102113 - TOILET COMPARTMENTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Solid-polymer (HDPE) toilet compartments configured as toilet enclosures (102113.A01).
 - 2. Solid-polymer (HDPE) urinal screens (102113.A02).
- B. Related Sections:
 - 1. Section 061000 "Rough Carpentry" for blocking.
 - 2. Section 102800 "Toilet, Bath, and Laundry Accessories" for toilet tissue dispensers, grab bars, and similar accessories.

1.2 COORDINATION

- A. Coordinate requirements for blocking, reinforcing, and other supports concealed within walls.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For toilet compartments and urinal screens. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Show layout and size of each toilet compartment.
 - 2. Show layout and size for each urinal screen.
 - 3. Show locations of cutouts for compartment-mounted toilet accessories.
 - 4. Show locations of centerlines of toilet fixtures.
 - 5. Show locations of floor drains.
- C. Samples for Initial Selection: For each type of unit indicated. Include Samples of compartment material involving texture and color selection.
- D. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:
 - 1. Each type of material, color, texture, and finish required for units, prepared on 6-inch- square Samples of same thickness and material indicated for Work.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has five years of similar installations.
- B. Source Limitations: For products listed in the Part 2 articles, obtain products from single source from single manufacturer.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

1.7 WARRANTY

- A. Guarantee entire installation for a period of two years from date of project Substantial Completion against defects in material and workmanship. Guarantee covers repair or replacement, with no costs to the Owner, of any and all items which become defective within the 25-year period.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire Performance: Tested in accordance with, and pass the acceptance criteria of, NFPA 286.
- B. Recycled Content: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
- C. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for toilet compartments designated as accessible.

2.2 SOLID-POLYMER TOILET COMPARTMENTS (102113.A01)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Scranton Products, Hiney Hiders "Eclipse" toilet enclosure units or comparable product by one of the following:
 - 1. Accurate Partitions Corporation.
 - 2. Bradley Corporation; Mills Partitions.
 - 3. General Partitions Mfg. Corp.
 - 4. Hadrian
 - 5. Partition Systems Incorporated of South Carolina (PSISC).
- B. Toilet-Enclosure Style: Floor-mounted overhead braced.
 - 1. Compartment Depth and Width: As scheduled and indicated on Drawings.
 - 2. Door Width: As scheduled and indicated on the Drawings.
 - 3. Height Above Floor: 9 inches (305 mm).
 - 4. Door/Panel Height: As scheduled and indicated on the Drawings.
 - 5. Pilaster Height: As scheduled and indicated on Drawings.
- C. Urinal-Screen Style: Floor-mounted, overhead braced with continuous wall brackets.
- D. Door, Panel, Screen, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, seamless, with eased edges, "no-sightline system" and with homogenous color and pattern throughout thickness of material.
 - 1. Material Thicknesses:
 - a. Doors, Pilasters, Panels and Screens: 1 inch.
 - 1) Edge condition: Eased edges, except shiplap at latch stile of door to pilaster to eliminate sightline into toilet compartment.
 - b. Panels: Not less than 1 inch.
 - c. Compartments shall incorporate a lap joint at latch stile of doors and adjacent pilaster, and continuous hinges at hinge stile of door and adjacent pilaster to eliminate sightlines into stalls.
 - 2. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum or stainless-steel strip fastened to exposed bottom edges of solid-plastic components to hinder malicious combustion.
 - 3. Pilaster shoes shall be 3 inches (76 mm) high, one-piece molded HDPE secured to the pilaster with a stainless-steel tamper resistant Torx head sex bolt.
 - 4. Color and Pattern: One color, pattern and texture in each room.
 - a. Color and Pattern: As selected by Architect from manufacturer's full range.
- E. Brackets (Fittings):
 - 1. Full-Height (Continuous) Type: Manufacturer's standard design; extruded aluminum or stainless steel.

2.3 HARDWARE AND ACCESSORIES

- A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.
 - 1. Material: Clear-anodized aluminum or stainless steel.
 - 2. Hinges: Provide 8-inch, "wrap-around" hinges fabricated from aluminum in a bright anodized finish. Hinges shall have field adjustment capability. Hinge shall be self-closing to within 15 degrees of opening. Mount with through-bolts.
 - 3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
 - a. Coordinate design of door and latch to provide "no-sight line" configuration.
 - b. Type 1 Latch and Keeper: Manufacturer's standard stainless-steel surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible. Intent is to match existing.
 - c. Type 2 Latch: Manufacturer's standard stainless-steel occupancy indicator latch. Latch to be mounted to the pilaster with integrated function as keeper for in-swinging doors. Latch will provide emergency access through an accessible slotted center pin in the external indicator.
 - 4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
 - 5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
 - 6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
- B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.
- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match the items they are securing, with vandal-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel.

2.4 MATERIALS

- A. Aluminum Castings: ASTM B 26/B 26M.
- B. Aluminum Extrusions: ASTM B 221.
- C. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.
- D. Stainless-Steel Castings: ASTM A 743/A 743M.
- E. High density polyethylene (HPDE), fabricated from polymer resins compounded under high pressure, forming single thickness panel.

2.5 FABRICATION

- A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.
- B. Floor-Mounted Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
 - 1. Each pilaster over 3 inches wide shall be anchored to floor with a minimum of two (2) anchors to prevent twisting.
 - 2. Overhead Bracing shall not be installed over open stall areas. At areas where additional overhead support is necessary, consult with architect to provide alternate means of support.

- C. Door Size and Swings: Unless otherwise indicated, provide 24-inch- wide, in-swinging doors for standard toilet compartments and 36-inch- wide, out-swinging doors with a minimum 32-inch- wide, clear opening for compartments designated as accessible.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.
 - 1. Confirm location and adequacy of blocking and supports required for installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
 - 1. Maximum Clearances:
 - a. Pilasters and Panels: 1 inch.
 - b. Panels and Walls: 1 inch.
 - 2. Brackets: Secure panels to walls and to pilasters with continuous brackets.
 - a. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.
- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels and adjust so tops of doors are parallel with overhead brace when doors are in closed position.
- C. Urinal Screens: Attach screens to pilasters and walls with continuous brackets and anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.3 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.
- B. Clean exposed surfaces of compartment systems using materials and methods recommended by manufacturer and provide protection as necessary to prevent damage during remainder of construction period.

3.4 FINAL PROTECTION

- A. Provide final protection and maintain conditions the ensure toilet compartments and screens are without damage and deterioration at time of Substantial Completion.
- B. If any damage occurs, replace unit(s), unless repairs acceptable to Architect can be made.
- C. Should damage occur to partition, door or pilaster in shipping, those damaged items shall be replaced within 30 days.

END OF SECTION 102113

SECTION 102238 - OPERABLE PANEL PARTITIONS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Manually operated, acoustical paired panel partitions. (102238.A02- **Type H1**)
- B. Related Requirements:
 - 1. Section 055000 "Metal Fabrications" for supports that attach supporting tracks to overhead structural system.
 - 2. Section 092900 "Gypsum Board" for fire-rated assemblies and sound barrier construction above the ceiling at track.

1.2 DEFINITIONS

- A. NIC: Noise Isolation Class.
- B. NRC: Noise Reduction Coefficient.
- C. STC: Sound Transmission Class.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For operable panel partitions.
 - 1. Include plans, elevations, sections, details, and attachments to other work.
 - 2. Indicate stacking and operating clearances. Indicate location and installation requirements for hardware and track, blocking, and direction of travel.
 - 3. Include imposed loads on supporting structure.
 - 4. Include setting drawings showing embedded items and cutouts required for other work, including support beam punching template.
 - 5. Electrical and communications Sections for electrical service and connections for motor operators, controls, and limit switches and for system disconnect switches.
- C. Samples for Initial Selection: For each type of exposed material, finish, covering, or facing.
 - 1. Include Samples of accessories involving color selection.
 - 2. Include Samples representative of custom printing capability for Custom Digital Printed Plastic Laminate.
- D. Samples for Verification: For each type of exposed material, finish, covering, or facing, prepared on Samples of size indicated below:
 - 1. Textile Facing Material: Full width by not less than 36-inch-long section of fabric from dye lot to be used for the Work, with specified treatments applied. Show complete pattern repeat.
 - 2. Markerboard Material: Not less than 6 inches square with two adjoining sides with trim.
 - 3. Vinyl Facing Material: Full width by 36-inch-long section of vinyl facing showing complete pattern repeat.
- E. Schedule: Submit schedule of door units using same room/opening designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Partition track, track supports and bracing, switches, turning space, and storage layout.
 - 2. Suspended ceiling components.
 - 3. Structural members to which suspension systems are attached.
 - 4. Size and location of initial access modules for acoustical tile.
 - 5. 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.
 - 6. Plenum acoustical barriers.
 - 7. Include plans, elevations, sections, attachment details and numbered panel installation sequence.
 - 8. Indicate stacking and operating clearances. Indicate location and installation requirements for hardware, track motor drive and drive box.
 - 9. Include diagrams for power, signal, and control wiring.
- B. Delegated-Design Submittal: For operable panel partitions.
 - 1. Include design calculations for restraints, anchors, and bracing to structure above.
- C. Setting Drawings: For embedded items and cutouts required in other work, including support-beam, mounting-hole template.
- D. Qualification Data: For qualified Installer.
- E. Field quality-control reports.
- F. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For operable panel partitions to include in maintenance manuals.
 - 1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
 - a. Panel finish facings and finishes for exposed trim and accessories. Include precautions for cleaning materials and methods that could be detrimental to finishes and performance.
 - b. Seals, hardware, track, track switches, carriers, and other operating components.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same production run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Panel Finish-Facing Material: Furnish full width in quantity to cover both sides of two panels when installed.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer and as follows:
 - 1. Installer shall have not less than 5 years of continuous experience, under the current company name, installing specified or similar systems.
 - 2. Installer shall have successfully completed no fewer than 5 comparable scale projects using specified or similar systems.

- B. Preparation of the opening shall conform to the criteria set forth per ASTM E557 Standard Practice for Architectural Application and Installation of Operable Partitions.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protectively package and sequence panels in order for installation. Clearly mark packages and panels with numbering system used on Shop Drawings. Do not use permanent markings on panels.
- B. Protect panels during delivery, storage and handling to comply with manufacturer's recommendations and as required to prevent damage.

1.10 WARRANTY

- A. Special 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. Partition Warranty Period: Two (2) years from date of Substantial Completion.
 - 3. Suspension System Warranty Period: Five (5) years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design structural anchoring and bracing of stacking racks, drive box and motors and tracks to structure above.
- B. Acoustical Performance: Provide operable panel partitions tested by a qualified testing agency for the following acoustical properties according to test methods indicated:
 - 1. Sound-Transmission Requirements: Operable panel partition assembly tested for laboratory sound-transmission loss performance according to ASTM E 90, determined by ASTM E 413, and rated for not less than the STC indicated.
 - 2. Noise-Isolation Requirements: Installed operable panel partition assembly, identical to partition tested for STC, tested for NIC according to ASTM E 336, determined by ASTM E 413, and rated for 11 dB less than STC value indicated.
 - 3. Noise-Reduction Coefficient (NRC) rating: Installed operable panel partitions assembly shall be according to ASTM C423.
- C. Fire-Test-Response Characteristics: Provide panels with finishes complying with one of the following as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. Surface-Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
 - 2. Fire Growth Contribution: Complying with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265 Method B Protocol or NFPA 286.
- D. Fire Resistance: Provide fire-rated operable panel partition assemblies including pass doors complying with NFPA 80, based on testing according to UL 10B for fire-rated door assemblies.
 - 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.

2.2 MANUAL OPERABLE ACOUSTICAL PAIRED PANELS (102238.A02 - **TYPE H1**).

- A. Operable Acoustical Panels: Partition system shall consist of, but not be limited to: series of individual flat panels, manually operated, top supported with automatic floor seals and fixed tops seals. System shall also include: panel finish facing, suspension system, and accessories.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Modernfold, Inc.; "Acousti-Seal Legacy Paired Panel Model No. 932."
 - 2. Comparable products from the following manufacturers, which meet or exceed specified requirements, will be considered when submitted to and accepted by Architect prior to bidding:
 - a. Hufcor, Inc.
 - b. Kwik Wall.
 - c. Panelfold, Inc.
- B. Panel Operation: Flat panels hinged together in pairs, manually operated, top supported with operable floor seals.
- C. Panel Construction: All panel horizontal and vertical framing members shall be fabricated from minimum 16-gauge formed steel with overlapped and welded corners for rigidity. Top channel shall be reinforced to support suspension system components. Frame shall be designed so that full vertical edges of panels are of formed steel and provide concealed protection of the edges of the panel skin.
 - 1. Panel Dimensions: Fabricate operable acoustical panel partitions to form an assembled system of dimensions indicated and verified by field measurements.
 - a. Panel Width: Standard widths.
 - b. Panel Thickness: 3 inches.
- D. Acoustical Rating or Panel: 52 STC
- E. Panel Weight: Approximately 11 lbs per sq. ft.
- F. Panel Materials:
 - 1. Steel Frame: Steel sheet, manufacturer's standard, but not less than 16 gauge nominal minimum thickness for uncoated steel. Frame shall have overlapped and welded corners. Top channel of frame shall be reinforced.
 - 2. Steel Face/Liner Sheets: Tension-levleed steel sheet, manufacturer's standard minimum nominal thickness for uncoated steel. Panel face sheets shall be lock-formed and welded directly to frame for unitized construction.
- G. Panel Finishes:
 - 1. General: Provide finish facings for panels 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.
 - a. Apply one-piece, seamless facings free of air bubbles, wrinkles, blisters, and other defects, 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.
 - b. Where facings with directional or repeating patterns or directional weave or matching grain are indicated, mark facing top and attach facing in same direction.
 - c. Match facing pattern 72 inches above finished floor.
 - 2. Fabric Wall Covering: As indicated on Material Finish Legend.
 - 3. Porcelain steel markerboard surfaces (102238.A06):
 - a. Magnetized surfaces where indicated.
 - b. Colors: White enamel.
 - c. Size: Panel width by 48 inches. Refer to Drawings for locations.
 - d. Trim: Horizontal trim with no visible screws or exposed joints and with corners mitered to a neat, hairline joint.
- H. Panel Trim:
 - 1. Exposed Panel trim of on consistent color: Smoke Gray
 - 2. No vertical trim required or allowed on edges of panel.
- I. Panel Closure: Manufacturer's standard unless otherwise indicated.
 - 1. Final Closure: Hinged Panel Closure.

- J. Hardware: Manufacturer's standard as required to operate operable panel partition and accessories; with decorative, protective finish.
 - 1. Hinges: Concealed laminated hinges with anti-friction segments mounted between each heat-treated link. Hinge to be attached directly to panel frame. Welded internal hinge brackets.
 - 2. Lockset: Manufacturer to prep partition to accept mortise cylinder "by others."
- K. Sound Seals
 - 1. General: Provide seals that produce operable panel partitions complying with performance requirements and the following:
 - a. Manufacturer's standard seals unless otherwise specified.
 - b. Seals made from materials and in profiles that minimize sound leakage.
 - c. Seals fitting tight at contact surfaces and sealing continuously between adjacent panels and between operable panel partition perimeter and adjacent surfaces, when operable panel partition is extended and closed.
 - 2. Vertical Seals: Roll-formed, interlocking steel astragals with reversible tongue and groove configuration in each panel edge for universal panel operation.
 - 3. Horizontal Top Seals: Continuous extruded vinyl bulb shape with pairs of non-contacting vinyl fingers.
 - 4. Horizontal Bottom Seals: A2 Automatic operable seals providing nominal 2 inch operating clearance with an operating range of + 1/2 inch to -1-1/2 inch which automatically drop as panels are positioned without the need for tools or cranks.

2.3 SUSPENSION SYSTEMS

- A. Tracks: Steel with adjustable steel hanger rods for overhead support, designed for 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 between bracket supports. Provide a continuous system of track sections and accessories to accommodate configuration and layout indicated for partition operation and storage.
 - 1. Basis-of-Design Products:
 - a. Track shall be Modernfold, "#17" Suspension System.
 - 2. Panel Guide: Aluminum guide on both sides of the track to facilitate straightening of the panels; finished with factory-applied, decorative, protective finish.
 - 3. Head Closure Trim: As required for acoustical performance; with factory-applied, decorative, protective finish.
- B. Track: Minimum 11-gauge, 0.12 inch roll-formed steel track.
 - 1. Exposed track soffit: Steel, integral to track and pre-painted off-white.
 - 2. Supported with adjustable steel hanger brackets.
- C. Carriers: One all-steel trolley system as required for configuration type, size, and weight of partition and for easy operation; with ball-bearing wheels.
 - 1. Trolley shall have steel tired ball bearing wheels.
- D. Aluminum Finish: Mill finish or manufacturer's standard, factory-applied, decorative finish unless otherwise indicated.
- E. Steel Finish: Manufacturer's standard, factory-applied, corrosion-resistant, protective coating unless otherwise indicated.

2.4 ACCESSORIES

- A. Work Surfaces: Quantities, placement, and size indicated.
 - 1. Markerboard Surface (102238.A06): Porcelain steel marker/projection surface.
 - a. Surface Color: White enamel.
 - b. Size: 48 inches by 48 inches.
 - c. Trim: Horizontal trim with no visible screws or exposed joints and with corners mitered to a neat, hairline joint.
 - d. Finished end caps.

PART 3 EXECUTION

3.1 EXAMINATION

- A. 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.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare openings to receive operable panel partitions in accordance with ASTM E 557 "Standard Practice for Architectural Application and Installation of Operable Partitions."

3.3 INSTALLATION

- A. General: Comply with ASTM E 557 except as otherwise required by operable panel partition manufacturer's written installation instructions. The complete installation of the operable wall systems shall be by a certified factory-trained installers for their respective products and be in strict accordance with the approved shop drawings and manufacturer's standard printed specifications, instructions, and recommendations.
- B. Install operable panel partitions and accessories after other finishing operations, including painting, have been completed in area of partition installation.
- C. Install panels from marked packages in numbered sequence indicated on Shop Drawings.
- D. Broken, cracked, chipped, deformed, or unmatched panels are not acceptable.
- E. Broken, cracked, deformed, or unmatched gasketing or gasketing with gaps at butted ends is not acceptable.
- F. Light-Leakage Test: Illuminate one side of partition installation and observe vertical joints and top and bottom seals for voids. Adjust partitions for alignment and full closure of vertical joints and full closure along top and bottom seals.[Perform test and make adjustments before NIC testing.]

3.4 FIELD QUALITY CONTROL

- A. NIC Testing: Owner may engage a qualified testing agency to perform tests and inspections.
 - 1. Testing Extent: Testing agency shall test one of each type of operable panel partition installation.
 - 2. Testing Methodology: Perform testing of installed operable panel partition for noise isolation according to ASTM E336, determined by ASTM E413, and rated for not less than NIC indicated. Adjust and fit partitions to comply with NIC test method requirements.
- B. An operable panel partition installation will be considered defective if it does not pass tests and inspections.

3.5 ADJUSTING

- A. Adjust operable panel partitions, hardware, and other moving parts to function smoothly, and lubricate as recommended by manufacturer.
- B. Verify that safety devices are properly functioning.

3.6 CLEANING

- A. Clean soiled surfaces of operable panel partitions to remove dust, loose fibers, fingerprints, adhesives, and other foreign materials according to manufacturer's written instructions.

3.7 DEMONSTRATION

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

END OF SECTION 102238

This page intentionally left blank

SECTION 102600 - WALL AND DOOR PROTECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Shock Absorbing Corner Guards (102600.A03).
 - 2. End-of-Wall Guards (102600.A06).
- B. Related Requirements:
 - 1. Section 012300 "Alternates" for description of alternates affecting work of this Section.
 - 2. Section 087100 "Door Hardware" for metal armor, kick, mop, and push plates.
 - 3. Section 092900 "Gypsum Board" for corner trim included in gypsum board installation.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.
 - 2. Include fire ratings of units recessed in fire-rated walls and listings for door-protection items attached to fire-rated doors.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of actual units or sections of units showing the full range of colors available for each type of impact-resistant wall-protection unit indicated.
 - 1. Include Samples of accent strips and accessories to verify color selection.
 - 2. Digital Protective Wallcovering – submit a sample of each wall graphic type in the form of small-scale color proofs for each graphic or mural.
- C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
 - 1. Corner Guards: 12 inches long.
 - 2. Custom Printed Wall Graphic on Abuse Resistant Wall coverings: Provide sample of wallcovering containing printed graphic using artwork provided by Architect. Before printing, prepare full-color proofs which include a full-scale sample, as well as a reduced sample of the entire graphic for each wall graphic for the Architect's approval. Approved proof will set quality standards for graphic and aesthetic effect.
 - a. Sample size to be no less than 2'-0" to 4'-0" square or as otherwise indicated.
 - b. Sample area as indicated by Architect during proofs.
 - c. When wall graphic is divided into separate sections, provide separate proof of each section.
 - d. Samples to show color, texture, pattern, and thickness.
 - e. Sample of each product specified.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each impact-resistant wall protection unit to include in maintenance manuals.
 - 1. Include recommended methods and frequency of maintenance for maintaining optimum condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to plastic finishes and performance.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
- B. Include mounting and accessory components. Replacement materials shall be from same production run as installed units.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain impact-resistant wall protection units from single source from single manufacturer.
- B. Product Options: Drawings indicate size, profiles, and dimensional requirements of impact-resistant wall protection units and are based on the specific system indicated. Refer to Section 01 40 00 "Quality Requirements."
 - 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.
- C. Preinstallation Conference: Conduct conference at Project site.

1.6 MOCKUPS

- A. Mockups/Field Samples: Build mockups/field samples, to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Field Samples: Build field sample/mockup of typical wall areas as shown on Drawings.
 - a. Note: Mockup shall be a field sample of corner guard, baseboard, and adjacent areas in Project. Architect and manufacturer's representative will observe installation of first corner guard installation at Architect's selected location.
- B. Field testing shall be performed on field sample areas according to requirements in "Field Quality Control" Article.
- C. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store impact-resistant wall protection units in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
 - 1. Maintain room temperature within storage area at not less than 70 deg F during the period plastic materials are stored.

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 for not less than 72 hours before beginning installation and for the remainder of the construction period.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 450 or less.

2.2 CORNER GUARDS (102600.A03 - **CG1**):

- A. Basis of Design: Subject to compliance with requirements, provide mechanically fastened "LG Series - LG-200" by CS Acrovyn or a comparable product with the following criteria proposed to and accepted by Architect prior to bidding.
 - 1. Material: Impact resistant Clear Polycarbonate of 16 ft. lbs/inch tested per ASTM D-256.

2. Length of legs: 2 inch.
3. 1/32 inch (1.0 mm) radius cover.
4. Height: From top of base to ceiling unless otherwise indicated on the drawings.

2.3 END-OF-WALL GUARDS (102600.A06 - **CG2**)

- A. Drywall Molding End Closure: Fabricated from extruded aluminum alloy 6063 T5.
- B. Basis-of-Design Product: Subject to compliance with requirements, provide Fry-Reglet; "Drywall Molding End Closure No. DMEC-3750", or comparable product submitted to and approved by Architect prior to bidding.
- C. Product Characteristics:
 1. Material: Extruded aluminum alloy 6063 T5
 2. Color: As selected by Architect from manufacturer's full range of options.
 3. Width: 3.75 inches
 4. Height: Full height of finished wall surface, from top of wall base to ceiling.
 5. Fastening: Mechanically fastened.

2.4 MATERIALS

- A. Fasteners: Nonmagnetic stainless-steel metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.
- B. Plastic Materials: Chemical- and stain-resistant, high-impact-resistant plastic with integral color throughout; extruded and sheet material as required, thickness as indicated.
- C. 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.
- D. Adhesive: As recommended by protection product manufacturer.
- E. 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.
 1. Impact Resistance: Minimum 25.4 ft-lbf/in. of notch when tested according to ASTM D 256, Test Method A.
 2. Chemical and Stain Resistance: Tested according to ASTM D 543 and 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.
- F. 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 for Alloy 6063-T5.
- G. Stainless-Steel Sheet: ASTM A 240/A 240M.
- H. PETG (Polyethylene Terephthalate Glycol):
 1. Impact Resistance: Minimum 10 kj.m2 when tested according to ISO 180.
 2. Chemical and Stain Resistance: Tested in accordance with ASTM D543.
 3. Flame-Spread Index: 25 or less.
 4. Smoke-Developed Index: 450 or less.
- I. Galvanized-Steel Sheet: ASTM A 653/A 653M, G90 coating, either commercial steel, Type B, or structural steel, Grade 33, unless another grade is required by design loads.

2.5 FABRICATION

- A. Fabricate impact-resistant wall protection units to comply with requirements indicated for design, dimensions, and member sizes, including thicknesses of components.
 1. Provide surfaces free of chips, dents, and other imperfections.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and wall areas, 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 PREPARATION

- A. Complete finishing operations, including painting, before installing impact-resistant wall protection system components. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION AND CLEANING

- A. General: Install impact-resistant wall protection units 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 wall protection units in locations and at mounting heights indicated on Drawings.
 - 2. Provide mounting hardware, anchors, and other accessories required for a complete installation.
 - a. Provide anchoring devices to withstand imposed loads.
- B. Immediately after completion of installation, clean plastic covers and accessories as recommended by corner guard manufacturer.

END OF SECTION 102600

SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

TOILET, BATH, AND LAUNDRY ACCESSORIES

1.1 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.
 - a. Toilet Tissue Dispenser (102800.A01).
 - b. Paper Towel Dispenser (102800.A02).
 - c. Waste Receptacle (102800.A03).
 - d. Soap Dispenser (102800.A05).
 - e. Grab Bar (102800.A06).
 - f. Sanitary Napkin Dispenser Unit (SND) (102800.A07).
 - g. Sanitary Napkin Receptor Unit (SNR) (102800.A08).
 - h. Mirror Unit (102800.A10).
2. Public-use shower room accessories:
 - a. Shower Curtain (102800.A11).
 - b. Folding Shower Seat (102800.A12).
 - c. Robe Hook (102800.A14).
 - d. Coat Hook (102800.A15).
3. Accessories:
 - a. Under Lavatory guards (102800.A21).
 - b. Utility Shelf (102800.A22).
 - c. Mop and Broom Holder (102800.A23).

B. Related Sections:

1. Section 061000 "Rough Carpentry" for blocking required behind fixtures and accessories.
2. Section 102113 "Toilet Compartments".
3. Section 102116 "Shower & Dressing Compartments".
4. Division 26 for electrical requirements for illuminated mirror units and warm air dryers.

C. Owner will furnish, and contractor install the following accessories:

1. Toilet tissue dispensers.
2. Paper towel dispensers.
3. Soap dispensers.

D. Owner will furnish and install the following accessories:

1. Waste receptacles.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include the following:

1. Construction details and dimensions.
2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Material and finish descriptions.
4. Features that will be included for Project.
5. Manufacturer's warranty.
6. Include electrical characteristics.

B. Samples: Full size, for each accessory item to verify design, operation, and finish requirements.

1. Approved full-size Samples will be returned and may be used in the Work.

C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.
2. Identify products using designations indicated.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.
- B. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.

1.5 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
 - 1. Where cutouts are required in other work, provide templates, substrate preparation instructions, and directions for preparing cutouts and for installation of anchorage devices.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.6 WARRANTY

- A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, visible silver spoilage defects.
 - 2. Warranty Period: 15 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. 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.

2.2 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
- C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.
- D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.
- E. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- H. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

- I. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.3 PUBLIC-USE WASHROOM ACCESSORIES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products specified from Bobrick Washroom Equipment, Inc. or comparable products by one of the following:
 - 1. American Specialties, Inc.
 - 2. Bradley Corporation.
- B. Toilet Tissue Dispenser (102800.A01 - TTD) – Provided by Owner, Installed by Contractor.
- C. Paper Towel Dispenser (102800.A02 - PTD) – Provided by Owner, Installed by Contractor.
- D. Soap Dispenser (102800.A05 - SD) – Provided by Owner, Installed by Contractor.
- E. Grab Bars – GB, VGB, FGB (102800.A06):
 - 1. Bobrick:
 - a. B-6806.99; 36" 42" & 18" at Accessible Toilet Stalls.
 - b. B-6806.99; 18" & B-5861.99 at Shower.
 - c. B-6806.99; Series Wall-to-Floor Bar w/ bottom rail at DFs w/out Alcove.
 - d. FGB: B-4998.99 at Accessible Toilet and Shower Stall.
 - e. B-819298 Drinking Fountain Grab Bar; 33" height, projects 18" from the wall.
 - 2. Bradley:
 - a. 832-2 Series; 36" 42" & 18" at Accessible Toilet Stalls.
 - b. 832-2 Series; 18" & 16"x30" Horizontal Two-Wall Bar at Shower Stall.
 - c. 832-2 Series; Wall-to-Floor Bar w/ bottom rail at DFs w/out Alcove.
 - d. FGB: 8370-107-2 at Accessible Toilet and Shower Stall.
 - 3. ASI:
 - a. 3800-P Series; Type 01 36" 42" & 18" at Accessible Toilet Stalls.
 - b. 3800-P Series; Type 01 18" & Type 60 at Shower Stall.
 - c. 3800-P Series; Type 75 at Drinking Fountains without Alcove.
 - d. FGB: 3413-P at Accessible Toilet and Shower Stall.
- F. Sanitary Napkin Dispenser Unit (10 28 00.A07 - SND):
 - 1. Basis of Design Products:
 - a. ASI: Model # 0468
 - b. Bobrick: Model #B-47069 25
 - c. Bradley: Model #407-11
 - d. ASI: Model # 0468-2
 - e. Bobrick: Model #B-47064 25
 - f. Bradley: Model #407
 - 2. Fabricate cabinet of stainless steel, not less than 22 ga (.034"), all welded construction. Provide door of seamless stainless steel, minimum 18 ga (.050"), with returned edges and equipped with tumbler lockset. Provide identification reading "Napkins" and "Tampons" at coin slots; brand name advertising is not allowed. Capacity not less than 18 napkins and 28 tampons.
 - 3. Operation: 25-cent coin operation, with locked coin box keyed separately from door and other accessory units.
- G. Sanitary-Napkin Receptor Unit (102800.A08 - SNR):
 - 1. Basis of Design Products:
 - a. Bradley: Model 4721-15 & 4722-15.
 - b. ASI: Model 0473-1A & 0472-1.
 - 2. Mounting: Surface.
 - 3. Door or Cover: Self-closing, disposal-opening cover and hinged face panel with tumbler lockset.
 - 4. Receptacle: Removable.
 - 5. Material and Finish: Stainless steel, No. 4 finish (satin).
- H. Mirror Unit (102800.A10 – M1, M2, M3):
 - 1. Basis-of-Design Products:
 - a. Bobrick Washroom Equipment, Inc.; B-290 Series.

- b. ASI: Model 0600.
 - 2. Types:
 - a. M1 – Shall be 24-inches wide x 36-inches height.
 - b. M2 – Shall be 60-inches wide x 36-inches height.
 - c. M3 – Shall be 36-inches wide x 72-inches height.
 - 3. Frame Stainless-steel channel, in No.4 satin finish.
 - 4. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
 - a. Concealed wall hanger bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
 - b. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
 - 5. Glazing: Provide polished tempered glass mirror in locker rooms and gym facilities. Provide polished non-tempered glass mirror in other locations unless noted otherwise.
 - 6. Sizes: As indicated on Drawings.
- I. Coat Hook (102800.A15 - CH):
- 1. Basis-of-Design Product: Bobrick Washroom Equipment, Inc.; B-542 Series.
 - 2. Description: Single hook pin model with concealed mounting. Unit shall be 1-15/16 inch in diameter.
 - 3. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

2.4 PUBLIC-USE SHOWER ROOM ACCESSORIES

- A. Source Limitations: Obtain public-use shower room accessories from single source from single manufacturer.
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product specified or comparable product by one of the following:
 - 1. American Specialties, Inc.
 - 2. Bradley Corporation.
- C. Shower Grab Bar (102800.A06 – SGB):
 - 1. Basis-of-Design Product: Bobrick Washroom Equipment, Inc.;
 - a. Type 1 - B-6861.99 Series.
 - b. Type 2 – B-5837.99
 - 2. Mounting: Flanges with concealed fasteners.
 - 3. Material: Stainless steel, 0.05 inch thick.
 - a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.
 - 4. Outside Diameter: 1-1/2 inches.
 - 5. Configurations and Lengths for two wall bar:
 - a. Type 1 - 15-7/8" x 30-7/8".
 - b. Type 2 – 36" x 54".
- D. Shower Curtain and Shower Rod (102800.A11 – SC & SCR):
 - 1. Basis of Design Products:
 - a. Shower Curtain: B 204-3.
 - b. Weighted Shower Curtain: Provide "Weighted Shower Curtains" by Accessible Construction.
 - 1) Color: White.
 - 2) Size: 72" x 72"
 - c. Shower Curtain Hooks: B 204-1.
 - d. Shower Curtain Rod: B-6047.
 - 2. Curtain Size: Minimum 70 inches by 72 inches high.
 - 3. Curtain Material: Nylon reinforced vinyl, minimum 0.008 inch (0.2 mm) thick, opaque, matte, with integral antibacterial agent, self-deodorizing, and flame retardant.
 - 4. Curtain Color: White.
 - 5. Curtain Grommets: Corrosion resistant at minimum 6 inches o.c. through top hem.
 - 6. Shower Curtain Hooks: Chrome-plated or stainless-steel, spring wire curtain hooks with snap fasteners, sized to accommodate specified curtain rod. Provide one hook per curtain grommet.
 - 7. Shower Rod Description: 1-1/4-inch OD; fabricated from nominal 0.05-inch-thick stainless steel.
 - a. Mounting Flanges: Stainless-steel flanges designed for exposed fasteners.
 - b. Finish: No. 4 (satin) finish.
- E. Folding Shower Seat (102800.A12 - FSS):

1. Configuration: L-shaped seat, designed for wheelchair access.
 2. Seat: Phenolic or polymeric composite of slat-type or one-piece construction in color as selected by Architect.
 3. Mounting Mechanism: Stainless steel, No. 4 finish (satin).
 4. Acceptable models from listed manufacturers:
 - a. Bobrick; B-518, reversible to suit configuration indicated.
 - b. Bradley; 9594, reversible to suit configuration indicated.
 - c. ASI 8206R or 8206L, to suit configuration indicated.
- F. Robe/Towel Hook (102800.A14 - RH):
1. Description: Single-prong unit.
 2. Material and Finish: Stainless steel, No. 4 finish (satin).
 3. Acceptable models from listed manufacturers:
 - a. Bobrick; B-983.
 - b. Bradley; SA36.
 - c. ASI 123.

2.5 UNDER-LAVATORY GUARDS

- A. Under-lavatory Guard (102800.A21):
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Plumberex Specialty Products, Inc.
 - b. Truebro by IPS Corporation.
 2. Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct contact with and burns from piping; allow service access without removing coverings.
 3. Material and Finish: Antimicrobial, molded plastic, white.

2.6 CUSTODIAL ACCESSORIES

- A. Utility Shelf – SH (102800.A22 - SH):
1. Basis of Design Products:
 - a. Bobrick: B-298x18.
 - b. Bradley: 758-18 Series.
 - c. ASI: 0692-818.
 2. Dimensions: Depth- 8" x Length - 18".
 3. Finish: Satin Stainless Steel.
- B. Mop and Broom Holder with Shelf (102800.A23 - MBH):
1. Description: Unit with shelf, hooks and mop/broom holders.
 2. Length: 34 inches.
 3. Hooks: Four.
 4. Mop/Broom Holders: Three, spring-loaded, rubber hat, cam type.
 5. Material and Finish: Stainless steel, No. 4 finish (satin).
 6. Acceptable models from listed manufacturers.

2.7 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 102800

SECTION 104413 - FIRE EXTINGUISHER CABINETS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fire protection cabinets for the following:
 - a. Portable fire extinguishers.
 - 1) Provide fire extinguishers for each fire extinguisher cabinet, except where indicated as bracket-mounted.
 - b. Extinguisher Cabinet types:
 - 1) Steel Cabinets
 - (a) 10 44 13.A03 Semi-Recessed Cabinet (rolled edge trim)
 - (b) 10 44 13.A04 Surface Mounted Cabinet
- B. Related Requirements:
 - 1. Section 104416 "Fire Extinguishers."

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire protection cabinets.
 - 1. Fire Protection 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.
- B. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For fire protection cabinets to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Fire-Rated, Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.

1.5 COORDINATION

- A. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
 - 1. Coordinate sizes and locations of fire protection cabinets with wall depths

1.6 SEQUENCING

- A. Apply vinyl lettering on field-painted, fire protection cabinets after painting is complete.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
 - 1. Finish: Baked enamel, TGIC polyester powder coat, HAA polyester powder coat, epoxy powder coat, or polyester/epoxy hybrid powder coat, complying with AAMA 2603.
 - a. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - b. Color: As selected by Architect from manufacturer's full range.
- B. Tempered Break Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 1.5 mm thick.

2.2 FIRE PROTECTION CABINET

- A. Cabinet Type: Suitable for fire extinguisher.
 - 1. Basis of Design Products: Subject to compliance with requirements provide Larsen's Manufacturing Company; Architectural Series products from:
 - a. Larsen's Manufacturing Company; Architectural Series.
 - b. Amerex.
 - c. J. L. Industries, Inc., a division of Activar Construction Products Group.
 - d. Potter Roemer LLC.
 - e. Comparable products from other manufacturers may be used when submitted to and accepted by Architect prior to bidding.
 - 2. 104413.A03 - Steel Cabinet, Non-rated, Semi-recessed. 2-1/2" Rolled.
 - a. Type 03: Semi-recessed Non-rated Cabinets: Larsen's Manufacturing Company; Architectural Series, Model 2409-6R.
 - 3. 104413.A04 - Steel Cabinet, Non-rated, Surface Mounted.
 - a. Type 04: Surface Mounted Non-rated Cabinets: Larsen's Manufacturing Company; Architectural Series, Model 2409-SM.
- B. Cabinet Construction:
 - 1. Nonrated.
- C. Cabinet Material: Steel sheet.
 - 1. Shelf: Same metal and finish as cabinet.
- D. Semi-recessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semi-recessed cabinet installation.
 - 1. Rolled-Edge Trim: 2-1/2-inch backbend depth.
- E. Surface Mounted Cabinet: Cabinet box fully exposed and mounted directly on wall.
- F. Cabinet Trim Material: Same material and finish as door.
- G. Door Material: Steel
- H. Door Style: Horizontal duo panel with frame.
- I. Door Glazing: Acrylic sheet.
 - 1. Acrylic Sheet Color: Transparent acrylic sheet.
- J. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
 - 1. Provide projecting door pull and friction latch.
 - 2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.
- K. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated.
 - a. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER."
 - 1) Location: Applied to cabinet door.
 - 2) Application Process: Pressure-sensitive vinyl letters.
 - 3) Lettering Color:
 - (a) Red.
 - 4) Orientation: Vertical.
- L. Cabinet Finish:
 1. Manufacturer's standard baked-enamel paint for the following.
 2. Color: White as manufacturer prime coat. Cabinets to be painted in field
 3. Powder Coat Finish:
 - a. Color: White.
 4. Interior of cabinet to match exterior.
 5. Door and Trim: Match fire extinguisher door face finish.

2.3 FABRICATION

- A. Fire Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
 1. Weld joints and grind smooth.
 2. Provide factory-drilled mounting holes.
- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
 1. Fabricate door frames of one-piece construction with edges flanged.
 2. Miter and weld perimeter door frames.
- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.4 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 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.

2.5 STEEL FINISHES

- 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" . After cleaning, apply a conversion coating suited to the organic coating to be applied over it.
- B. Baked-Enamel or Powder-Coat Finish: Interior box 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.
 1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where semi-recessed cabinets will be installed. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare recesses for semi-recessed fire protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

- A. General: Install fire protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
- B. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.
 - 1. Fasten mounting brackets to inside surface of fire protection cabinets, square and plumb.
 - 2. Fire-Rated, Cabinets:
 - a. Install cabinet with not more than 1/16 inch tolerance between pipe OD and knockout OD. Center pipe within knockout.
 - b. Seal through penetrations with firestopping sealant as specified in Division 07 Section "Penetration Firestopping."
- C. Identification: Apply vinyl lettering at locations indicated.

3.4 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly. On completion of fire protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
- C. Touch up marred finishes, or replace fire protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire protection cabinet and mounting bracket manufacturers.
- D. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 104413

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.5 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Six years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Amerex Corporation.
 - b. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - c. Larsens Manufacturing Company.
 - d. Potter Roemer LLC.
 - e. Comparable products from other manufacturers may be used when submitted to and accepted by Architect prior to bidding.
 - 2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B, and bar coding for documenting fire-extinguisher location, inspections, maintenance, and recharging.

- B. Multipurpose Dry-Chemical Type (104416.A01): UL-rated 3-A:40-B:C, 5 lbs. nominal capacity, with mono-ammonium phosphate-based dry chemical in manufacturer's standard enameled container.
- C. Multipurpose Dry-Chemical Type (104416.A01): UL-rated 4-A:80-B:C, 10 lbs. nominal capacity, with mono-ammonium phosphate-based dry chemical in manufacturer's standard enameled container.
- D. Wet-Chemical Type (104416.A02) Bracket Mounted: UL-rated 2-A:1-B:C:K, 1.6 gal. nominal capacity, with potassium acetate-based chemical in stainless-steel container, with pressure indicating gage.

2.3 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Examine fire extinguishers for proper charging and tagging.
 - 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
 - 1. Mounting Brackets: 48 inches above finished floor to top of fire extinguisher.
- C. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 104416

SECTION 105113 - METAL LOCKERS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Knocked-down, ventilated metal lockers (105113.A01).
 - a. 2-high box x 18"

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of metal locker.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal locker and bench.
 - 2. Include factory prepared installation instructions.
- B. Shop Drawings: For metal lockers.
 - 1. Include plans, elevations, sections, details, and attachments to other work.
 - 2. Show locker trim and accessories.
 - 3. Include locker identification system and numbering sequence.
- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available.
- D. Product Schedule: For lockers, use same designations as indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Full-size units of the following metal locker hardware items equal to 10 percent of amount installed for each type and finish installed, but no fewer than the number of units listed below:
 - a. Hooks.
 - b. Identification plates.
 - c. Locks.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver metal lockers until spaces to receive them are clean, dry, and ready for their installation.
- B. Deliver master and control keys along with combination control charts to Owner by registered mail or overnight package service.

1.8 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of recessed openings by field measurements before fabrication.

1.9 COORDINATION

- A. Coordinate sizes and locations of concrete bases for metal lockers.
- B. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that metal lockers can be supported and installed as indicated.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures.
 - b. Faulty operation of latches and other door hardware.
 - 2. Damage from deliberate destruction and vandalism is excluded.
 - 3. Warranty Period for Knocked-Down Metal Lockers: Two years from date of Substantial Completion.
 - 4. Warranty Period for Welded Metal Lockers: Lifetime from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain metal lockers, locker benches, and accessories from single source from single locker manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Accessibility Requirements: For lockers indicated to be accessible, comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC A117.1.

2.3 STUDENT KNOCKED-DOWN CORRIDOR LOCKERS (105113.A01)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide lockers from one of the following:
 - 1. Penco
 - 2. List Industries Inc.
 - 3. Lyon Workspace Products, LLC.
 - 4. Republic Storage Systems Company.
- B. Locker Arrangement:
 - 1. Type: 2-high box (105113.A01).
 - a. Dimensions: 15 inches wide by 18 inches deep by 72 inches tall.

- b. Compartments: Each column shall have two equally-sized compartments approximately 36 inches tall.
 - c. Lockers shall be equipped with sloping tops.
- C. Locker Base as indicated on Drawings.
- D. Perforated Doors: One piece; fabricated from 0.075-inch nominal-thickness (14 gauge) steel sheet with "mini-louver" perforations; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges.
 - 1. Mini-Louver Vents: Manufacturer's standard, stamped horizontal or vertical.
 - 2. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches wide; welded to inner face of doors.
 - a. No fewer than three louver openings at top and bottom for double-tier lockers.
- E. Body: Assembled by riveting or bolting body components together. Fabricate from unperforated steel sheet with thicknesses as follows:
 - 1. Tops, Bottoms, and Intermediate Dividers: 0.024-inch nominal thickness, with single bend at sides.
 - 2. Backs and Sides: 0.024-inch nominal thickness, with full-height, double-flanged connections.
 - 3. Shelves: 0.024-inch nominal thickness, with double bend at front and single bend at sides and back.
- F. Frames: Channel formed; fabricated from 0.060-inch nominal-thickness steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral, full-height door strikes on vertical main frames.
- G. Reinforced Bottoms: Structural channels, formed from 0.060-inch nominal-thickness (16 gauge) steel sheet; welded to front and rear of side-panel frames.
- H. Hinges: Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees. Provide one of the following types of hinges:
 - 1. Knuckle Hinges: Steel, full loop (to wrap around pin), five or seven knuckles, tight pin; minimum 2 inches high. Provide no fewer than three hinges for each door more than 42 inches high.
 - 2. Continuous Hinges: Manufacturer's standard, steel, full height.
- I. Recessed Door Handle and Latch: Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond door face; pry and vandal resistant.
 - 1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks, built-in key locks, or padlocks; positive automatic latching and prelocking.
 - a. Latch Hooks: Equip doors 48 inches and higher with three latch hooks and doors less than 48 inches high with two latch hooks; fabricated from 0.105-inch nominal-thickness steel sheet; welded or riveted to full-height door strikes; with resilient silencer on each latch hook.
 - b. Latching Mechanism: Manufacturer's standard, rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.
 - 2. Single-Point Latching: For box locker, provide nonmoving latch hook with steel padlock loop that projects through recessed cup and is finished to match metal locker body.
 - a. Latch Hook: Equip each door with one latch hook, fabricated from 0.105-inch nominal-thickness steel sheet; welded midway up full-height door strike; with resilient silencer.
- J. Door Handle and Latch for Box Lockers: Stainless-steel strike plate with integral pull, recessed so locking device does not protrude beyond door face; with steel padlock loop that projects through metal locker door.

2.4 LOCKS: PADLOCKS BY OWNER.

- A. Identification Plates: Manufacturer's standard, etched, embossed, or stamped aluminum plates, with numbers and letters at least 3/8 inch high.
- B. Hooks: Manufacturer's standard ball-pointed type hooks, aluminum or steel; zinc plated.
 - 1. double Tier Units: One double-prong ceiling hook and two single-prong wall hooks.
- C. Filler Panels: Fabricated from manufacturer's standard thickness, but not less than 0.036-inch nominal-thickness steel sheet.

- D. Boxed End Panels: Fabricated from 0.060-inch nominal-thickness steel sheet.
- E. Materials:
 - 1. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
- F. Finish: Baked enamel or powder coat.
 - 1. Color: As selected by Architect by manufacturer's full range of colors.

2.5 FABRICATION

- A. Fabricate metal lockers square, rigid, without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.
 - 1. Form body panels, doors, shelves, and accessories from one-piece steel sheet unless otherwise indicated.
 - 2. Provide fasteners, filler plates, supports, clips, and closures as required for complete installation.
- B. Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments. Factory weld frame members of each metal locker together to form a rigid, one-piece assembly.
- C. Equipment: Provide each locker with an identification plate and the following equipment:
 - 1. Double-Tier Units: One double-prong ceiling hook and two single-prong wall hooks.
- D. Knocked-Down Construction: Fabricate metal lockers using nuts, bolts, screws, or rivets for nominal assembly at Project Site.
- E. Accessible Lockers: Fabricate as follows:
 - 1. Locate bottom shelf no lower than 15 inches above the floor.
 - 2. Where hooks, coat rods, or additional shelves are provided, locate no higher than 48 inches above the floor.
- F. Continuous Sloping Tops: Fabricated in lengths as long as practical, without visible fasteners at splice locations; finished to match lockers.
 - 1. Sloping-top corner fillers, mitered.
 - 2. Provide sloping tops for locations indicated on Drawings.
- G. Recess Trim: Fabricated with minimum 2-1/2 inch face width and in lengths as long as practical; finished to match lockers.
- H. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip-joint filler angle formed to receive filler panel.
- I. Boxed End Panels: Fabricated with 1 inch wide edge dimension and designed for concealing fasteners and holes at exposed ends of non-recessed metal lockers; finished to match lockers.
 - 1. Provide one-piece panels for double-row (back to back) locker ends.
- J. Finished End Panels: Designed for concealing unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of non-recessed metal lockers; finished to match lockers.
 - 1. Provide one-piece panels for double-row (back-to-back) locker ends.
 - 2. Provide finished end panels for double-tier lockers.

2.6 ACCESSORIES

- A. Fasteners: Zinc- or nickel-plated steel, slotless-type, exposed bolt heads; with self-locking nuts or lock washers for nuts on moving parts.
- B. Anchors: Material, type, and size required for secure anchorage to each substrate.
 - 1. All anchors shall be corrosion resistant. Provide nonferrous-metal or hot-dip galvanized anchors and inserts.
 - 2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine walls, floors, and support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install lockers level, plumb, and true; shim as required, using concealed shims.
 - 1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches o.c. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.
 - 2. Anchor single rows of metal lockers to walls near top and bottom of lockers.
 - 3. Anchor back-to-back metal lockers to floor.
- B. Knocked Down Lockers: Assemble with standard fasteners, with no exposed fasteners on door faces or frames.
- C. Equipment:
 - 1. Attach hooks with at least two fasteners.
 - 2. Attach door locks on doors using security-type fasteners.
 - 3. Identification Plates: Identify metal lockers with identification indicated on Drawings.
 - a. Attach plates to upper shelf of each open-front metal locker, centered, with at least two aluminum rivets.
- D. Trim: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.
 - 1. Attach filler panels with concealed fasteners. Locate filler panels where indicated on Drawings.
 - 2. Attach sloping-top units to metal lockers, with closures at exposed ends.
 - 3. Attach finished end panels using fasteners only at perimeter to conceal exposed ends of non-recessed metal lockers.

3.3 ADJUSTING

- A. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding.

3.4 PROTECTION

- A. Protect metal lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit use during construction.
- B. Touch up marred finishes, or replace metal lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

END OF SECTION 105113

This page intentionally left blank

SECTION 114000 - FOOD SERVICE EQUIPMENT

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 the work of this Section. As defined, the Coordinating Trade shall be solely responsible for assigning and dividing the work among the Trades as necessary to accomplish the requirements of the Contract Documents.
- B. Related Sections: Refer to the following Sections and their Sub-Sections for materials, installation and code requirements related to surrounding surfaces, mechanical and electrical rough-ins, and connections to Food Service Equipment specified here-in. Refer to Part 1.6/B - Coordination, "Architectural, Plumbing, Mechanical, Electrical, and Food Service Requirements" within this Section for related work to be completed by the Trades responsible for the following Divisions.
 - 1. Divisions 02 through 14 (excluding Section 114000) and Architectural drawings for materials, construction, installation, and code requirements related to adjacent/surrounding/abutting construction at food service equipment.
 - 2. Division 22 Sections for service rough-ins; drain traps; atmospheric vents; valves, pipes, and fittings; and other materials required to complete food service equipment installation.
 - 3. Division 26 Sections for connections and electrical materials required to complete foodservice equipment installation.
 - 4. Division 27 Sections for data, voice, and audio-video communication systems.
 - 5. Divisions 28 Sections for electronic safety and security systems.

1.2 SUMMARY

- A. This Section includes equipment for the food service facilities indicated on the drawings. Extent of food service equipment work is indicated on the drawings and by the provisions of this Section, including schedules and equipment lists associated with either the drawings or this Section.
- B. Upon request, the successful bidding Provider of Food Service Equipment will be required to provide an itemized breakdown of cost for each individual equipment item. Owner will use the list, when necessary, for value engineering only.
- C. Installation shall include uncrating, setting-in-place, cleaning and leveling of new equipment so it is ready for fittings / controls installation & utility connections by other Trades. Installation shall also include removal, relocating, modifying (when specified), cleaning (of construction generated soils & debris), re-installing and leveling of current equipment designated to be relocated, as hereinafter specified, so it is ready for fittings and controls installation & utility connections by other Trades. Currently installed equipment is presently in operation within the existing servery. The Owner will relocate all small wares, utensils, etc. Coordinate removal of all existing equipment with Owner, Architect, and other Trades. Currently installed equipment requiring temporary storage during construction shall be relocated by the Provider of Food Service Equipment and stored in a space provided by the Owner within the facility. Equipment designated for relocation is the responsibility of the Provider of Food Service Equipment during construction and any damage to such will be their responsibility. Disconnection of currently installed equipment from electrical, mechanical, and plumbing service shall be done by other Trades. Plumbing, mechanical, and electrical connections to new and relocated equipment shall be done by other Trades.
- D. Removal of currently installed equipment, installation of relocated / new equipment, and phasing of this work must be coordinated with the Owner.
- E. The Provider of Food Service Equipment, before submitting its bid and having reviewed the plans and specifications, shall be fully satisfied as to its obligations as stated in these specifications, as shown on the drawings, and as otherwise required for a completed and properly operating installation at project completion. No allowance will be made to the Provider of Food Service Equipment for any error or obvious oversight on its part not called to the attention of the Food Service Consultant at least ten (10) days prior to bidding.
- F. Provide, as part of the Contract, a qualified food service equipment project foreman at the job site during all phases of construction relating to this contract. Foreman shall have the technical expertise to handle all phases of equipment installation. Foreman shall coordinate roughing-in equipment, equipment installation, and connections

with all other Trades at job. Foreman shall answer questions and determine locations for making required cut outs, etc., for satisfactory final installation. Discrepancies between food service requirements and plumbing, mechanical and electrical work shall be immediately forwarded to Architect/Food Facilities Consultant in writing.

- G. The specifications and drawings are complementary, and what is called for by the one shall be binding as if called for by all. Verification of quantities is the responsibility of the Provider of Food Service Equipment.
- H. Connection Plan drawings reflect point of connection locations on equipment and not rough-in locations.
- I. Definitions:
 - 1. Reference to Food Facility Consultant, whenever used in these specifications, shall mean mha Food Facility Consultants, LLC; 7840 Conser Street; Overland Park, KS 66204; phone 785-266-5696; email mike@mhaconsulting.com.
 - 2. These specifications are in abbreviated form and contain incomplete sentences. Omissions of words or phrases such as "The provider of food service equipment shall", "Shall", "shall be" "as noted on drawings", "according to the drawings", "a", "an", "the" and "all" are intentional. Omitted words and phrases shall be supplied by inference.
 - 3. "By Alternate" refers to a designated equipment item which shall be provided by the Food Service Equipment Provider upon acceptance of an Alternate as described in Division 01 of this specifications.
 - 4. "By Base Bid" refers to required equipment which may be substituted with the acceptance of an item designated as "By Alternate".
 - 5. "By Owner" refers to Owner-Furnished Equipment; equipment/items to be relocated/provided by the Owner or its supplier and is outside the contractual obligations of this project.
 - 6. "Contract Documents" consists of the agreement between the Owner and Trade(s) (prime and secondary) and all requirements therein related to Section 114000 Food Service Equipment including but not limited to: conditions of the contract (Division 01, general and supplementary); all specifications; all drawings; all addenda issued prior to receiving of bids; all modifications, all change orders and all construction change directives.
 - 7. "Coordinating Trade" or "Trade responsible for coordinating all construction" refers to the person/entity/contractor solely responsible for supervising and directing the work as identified in the Owner/Contractor agreement.
 - 8. "EC" refers to the Electrical Trade.
 - 9. "Electrical Trade" refers to the person/entity/contractor solely responsible for providing the electrical work associated with installation and equipment connection.
 - 10. "Equipment" means food service equipment unless otherwise designated.
 - 11. "Existing" items are currently installed in the kitchen area being remodeled. They remain in their current installation location with no alteration except where noted as "MODIFIED". Removal/reinstallation, as necessary for other construction processes (i.e. new floors, etc.), is the responsibility of the food service equipment provider to determine and administer.
 - 12. "FSC", "Food Service Equipment Provider", "Provider of Food Service Equipment" and "Trade responsible for food service equipment" refer to the trade or entity solely responsible for providing, supplying and installing food service equipment specified herein (Section 114000) and as shown on the Food Service (FS) drawings.
 - 13. "Foreman" within this section, means the Provider of Food Service Equipment and its Foreman, unless otherwise indicated.
 - 14. "Future" designates equipment which is a basis for design and which the Owner will be procuring at a subsequent date. Equipment designated as such is not required (Not In Contract) and reference to "Provide" shall be interpreted to mean these items and their components/accessories/configurations will be provided as specified herein when the Owner chooses to do so.
 - 15. "GC" refers to the Coordinating Trade.
 - 16. "Install" means assemble/set in place and/or mount equipment ready for installation by other Trades of fittings and accessories supplied by the Food Service Equipment Provider as well as connections/interconnections by other Trades.
 - 17. "Installer" refers to the Trades (Coordinating, Mechanical, Plumbing and Electrical) and their sub-Trades who are responsible for unpacking, setting in place, leveling, caulking, connecting and cleaning equipment which has been "Supplied By Owner".
 - 18. "MC" refers to the Mechanical Trade.
 - 19. "Mechanical Trade" refers to the person/entity/contractor solely responsible for providing the mechanical work associated with installation and equipment connection.
 - 20. "Modified" refers to an alteration /change to be made by the Food Service Contractor to an existing or relocated item of food service equipment, as specified.
 - 21. "Other Trades" refers to Trades other than those responsible for providing food service equipment as specified in 114000.
 - 22. "PC" refers to the Plumbing Trade.

23. "Plumbing Trade" refers to the person/entity/contractor solely responsible for providing the plumbing work associated with installation and equipment connection.
24. "Provide" means to acquire and install.
25. "Provider" refers to the Trade responsible for acquiring and installing items designated as "Required".
26. "Relocated" refers to equipment to be moved, by the Food Service Equipment Provider, from its currently installed location, as described.
27. "Required" or "Req'd" designates an obligation by the Food Service Equipment Provider to supply/provide the designated equipment item/service as specified.
28. "Scrap" items become the property of the Food Service Equipment Provider for removal from the site and disposal.
29. "Salvage" items remain the property of the Owner and are to be removed from the existing kitchen and provided to the Owner at an Owner designated location for their removal from the site.
30. "Standard," "Standard Construction," "Specification of Standard," "Standard Specification(s)" refer to construction techniques, materials, methods and configurations specified in Part 2.2/B "Specification of Standard for Custom Fabricated or Modified Equipment" within this Section.
31. "Supply" means to acquire and relinquish to other Trades for installation.
32. "Trade" refers to the person/entity/contractor solely responsible for providing the construction activity associated with the use of the term.
33. "Vendor" refers to an Owner contracted supplier, outside the contractual obligations of this project, who will provide the designated equipment at the direction of the Owner.

1.3 SUBMITTALS

- A. Rough-in Plans: Dimensioned rough-in plans and diagrams prepared for this project must be submitted within thirty (30) days after receipt of Contract. Submit dimensioned Electrical, Plumbing and Mechanical rough-in plans FOR ALL UTILITIES SHOWN ON THE CONNECTION PLAN, inclusive of rough-ins associated with utilities not directly associated with equipment provided by the Food Service Equipment Provider (i.e. convenience outlets, future/by Owner equipment, etc.). The utility rough-in plan shall be a "rough-in" plan and not a "point-of-connection" plan. It shall include the following for all shown/specified as Required, By Base Bid and By Owner equipment:
 1. Equipment identification on all equipment and rough-in plans, equipment and rough-in list stainless steel schedules and notes shall reference the same Item No. designated on the contract document FS plans, and as designated here-in.
 2. A Food Service Equipment Plan which clearly shows equipment locations with dimensionally correct equipment outlines and clearances and architecturally related notes and dimensions, as required for general building construction and equipment installation, shall be included. Plan equipment shall be designated with its item number. An equipment schedule with item number, quantity, description, and remarks/notes shall be provided.
 3. Two (2) separate plans, one each for plumbing/mechanical and electrical, which clearly show lateral and longitudinal dimensions of electrical receptacle stainless steel switches/junction boxes, water lines, waste lines, floor sink/drains/troughs, and hood location and as required for rough-in of utilities by other Trades. Floor sinks/drains shall be located so as to be accessible, allowing easy removal of the grate, and located not to be in conflict with table legs, cabinet toe bases or other non-mobile equipment.
 4. Lateral, longitudinal and height dimensions locating rough-in points for utility connections from fixed points (i.e. wall, columns, etc.). Where walls are directly adjacent to equipment, all Mechanical and Electrical rough-ins shall occur within those walls to minimize floor obstructions. Floor penetrating rough-in locations at island equipment locations (e.g., tables, sinks, etc.) shall be located under equipment adequately so as not to be exposed to ready abuse or present a hazard to the equipment user. Conduit stub ups at back-to-back tables shall occur between the tables, centered on the backsplashes and a minimum of 6 inches in from the table ends.
 5. Utility connection sizes, loads, characteristics, etc., for equipment at its rough-in points. Include additional notes, as necessary, to explain connection requirements to the Trade(s) responsible for making final connections.
 6. Utility sizing and locations in accordance with exact equipment to be provided/supplied and its installation.
 7. Diagrams showing proper assemblage, installation, and inter-connection/connection of parts provided /supplied by the Food Service Equipment Provider and installed by other Trades.
 8. Wall, roof, floor, and ceiling openings required for complete installation of equipment. Show dimensions /location of through wall openings for pass through cabinets.
 9. Notes explaining special or unusual conditions which affect the work of other Trades.
 - a. Note location of in wall blocking for wall supported equipment, shelving, cabinets, hand sinks, hand sink pedals.
 10. Schedules of symbols and abbreviations.

- B. Fabrication Drawings: Before start of equipment fabrications, submit Fabrication Drawings for custom built equipment including plans, elevations, and Sections. Fabrication Drawings shall be at a scale not less than 1" = 1'-0" and in full detail, complete with detail notes, materials listings with gauges, fixtures and fittings, and finishes. Drawings shall accurately represent the equipment as it is to be fabricated including: dimensions for all sizes and locations; all punched holes; all coves; edge, backsplash and rim configurations; all underbracing, mounting brackets, support brackets; legs, casters and cross rails; disposer and work/scrap/wash sink bowls; undershelves and elevated shelves with in-wall blocking designated; drawers and enclosures; dish table configurations; exhaust ducts; chases, cabinet bases; receptacle boxes; field joints; etc. as specified herein and as shown.
- C. Product Data: Provide Buy-out Equipment Specification books containing manufacturer's technical product data and installation instructions on all non-custom, standard, manufactured equipment. Buy-out Equipment Specification books shall include the following for each equipment item, arranged by item number in the book:
1. A cover sheet listing the following:
 - a. Item Number
 - b. Quantity
 - c. Manufacturer and model number
 - d. Description
 - e. Electrical voltage/phase/amperage/wattage, NEMA plug configuration,
 - f. Options, accessories, and components as required by the contract documents and as necessary for proper operation and for accurately procuring the equipment.
 2. Manufacturer's standard catalog specification sheets with specifications, features, utility connection locations and requirements as necessary for the installing Trade(s) to make final connections. Where multiple equipment options /models /products exist on a specification sheet, highlight, or otherwise clearly mark, the specific item(s) proposed for delivery and installation.
 3. Submit color samples or swatches for buy-out equipment when selection is required.
- D. Unintentional approval of submitted incorrect/incomplete Shop Drawings and Specification sheet books shall not waive obligation of the Food Service Equipment Provider to provide/supply equipment, materials and construction methods as shown and specified herein.
- E. Operation and Maintenance Data: At minimum, furnish to the Owner three (3) sets of bound maintenance and parts manuals for all items of standard manufacture. Assemble manuals in book form, arranged by item number. Provide an index in the front listing Item No., Description as shown on Food Service Drawings and Manufacturer. Manuals shall also include copies of operating and maintenance instructions, adjustment and testing instructions, parts listing, and other applicable information necessary for proper maintenance and care of equipment. When available, provide equipment manufacturer's operation and maintenance videos in CD or DVD format. At least (1) one copy of the completed manual shall be available at the Owner demonstration for reference by the demonstrator and Owner.
- F. Authorized Service Agencies: At minimum, furnish to the Owner three (3) lists of local and/or nearby service agencies which have been authorized, by previous agreement with the provider of food service equipment, to make emergency service calls for each piece of custom built or buy-out food service equipment having mechanical or electrical components provided/supplied under this Contract. **Provide a minimum of two (2) service agencies, for each piece of equipment, from which the Owner may select.** List shall include specific equipment name, model no. and serial no., each authorized service agent's name, address, and phone number.
- G. Warranties: At minimum, provide to the Owner three (3) equipment warranty books. Provide at the front of each book a warranty listing in columnar form of all equipment used on the project. In landscape format, using Microsoft Word or similar word processing software, develop the warranty listing as follows:
1. Provide a header at the top of each page of the warranty listing, designating the Project Name, Food Service Equipment Provider Company Name, Project Manager, Address and Phone Number. Below this project information, in bold letters, designate the "Warranty Initiation Date _____" (Refer to 1.10 Service and Warranties).
 2. Below the header, designate across the top of each page, columns for Item No., Description, Manufacturer, Model No., Serial No., Warranty Period and Comments. Comments column used to designate specifics (where they apply) such as "year labor, 3 years materials" For items having multiple components with varying warranties, list each component and its information, on a separate line below the specific item number. Fill in all columns for each item.
 3. Additionally, provide in each warranty book a CD-R containing the warranty listing saved in an ASCII DOS Text format. CD-R shall be clearly labeled with project name and "KITCHEN EQUIPMENT WARRANTIES". Provide CD-R in a protective sleeve secured to the inside of the front leaf of the warranty book.

4. Behind the warranty listing provide, in order by item number, the manufacturer's standard warranty certificates. Designate the item number on each certificate and fill in all appropriate information as required by the equipment manufacturer. Food Service Equipment Provider is responsible for submitting to the manufacturer all appropriate information for initiating warranties.

1.4 QUALITY ASSURANCE

- A. Mechanical, plumbing, and electrical custom fabricated and buy-out equipment, work, materials, and installation shall meet applicable regulations and codes, including but not limited to:
 1. ADA (Americans with Disabilities Act): Foodservice serving line equipment shall be accessible to the physically challenged.
 2. AGA (American Gas Association): Provide gas burning equipment which complies with and is listed by the AGA.
 3. ANSI (American National Standards Institute) Standards: electric powered and gas-burning appliances, plumbing fittings including anti-siphonage water fittings and compressed gas piping shall meet applicable standards of the American National Standards Institute.
 4. ASHRAE15, "Safety Code for Mechanical Refrigeration."
 5. ASME (American Society of Mechanical Engineers): Provide steam-generating and direct-steam heating equipment that is fabricated and labeled to comply with ASME Boiler and Pressure Vessel Code.
 6. BISSC (Baking Industry Sanitation Standards Committee) Standards: Provide bakery equipment that complies with BISSC's "Sanitation Standards for the Design and Construction of Bakery Equipment and Machinery."
 - a. Provide BISSC-certified equipment.
 7. Clean Air Act for Stationary Refrigeration and Air Conditioning. (Protection of the Ozone, Recycling and Emission Reduction Program).
 8. Energy Independence and Security Act of 2007: Walk-in refrigerators/freezers and their refrigeration systems shall comply.
 9. Health Codes: National, State and Local which have jurisdiction, including, but not limited to the following:
 - a. Missouri Department of Health & Senior Services Food Safety, Missouri Food Code for the Food Establishments of the State of Missouri
 - b. City and local jurisdictional health and sanitation requirements.
 10. IMC (International Mechanical Code).
 11. IPC (International Plumbing Code).
 12. Montreal Protocol for installation and use of non-CFC content refrigerants and reduced HCFC content refrigerants.
 13. NEC (National Electric Code).
 14. NEMA (National Electric Manufacturers Association); Electrically operated buy-out and custom fabricated equipment shall conform to latest standard of National Electric Manufacturers Association.
 15. NFPA (National Fire Protection Association) Codes: equipment shall be manufactured and installed in accordance with applicable standards of the National Fire Protection Association (NFPA) codes including:
 - a. NFPA 54 - National Fuel Gas Code.
 - b. NFPA 70 - National Electrical Code.
 - c. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.
 - d. NFPA 17A - Standard for Wet Chemical Extinguishing Systems. Provide, for each equipment item protected by the hood fire suppression system and mounted on casters, four (4) caster centering guides, one at each equipment caster with the equipment setting in its protected location. This will identify the proper location for equipment during operation. Owner should acknowledge in a written statement that the casters /legs of movable equipment under the hood are to be setting within the caster centering guides before equipment is operated.
 16. NSF (National Sanitation Foundation) Standards: Provide equipment that bears NSF Certification Mark or UL Classification Mark certifying compliance with applicable NSF/ANSI standards.
 17. SNAP (Significant New Alternatives Policy): Refrigerants, foam blowing agents, their use and installation must be compliant with the Environmental Protection Agencies SNAP program for the safe and smooth transition away from ozone depleting compounds through the use of alternative refrigerants.
 18. UL (Underwriters Laboratories) Certification: Provide electric and fuel-burning equipment and components that are evaluated by UL for fire, electric shock, and casualty hazards according to applicable safety standards and that are UL certified for compliance and labeled for intended use.
 - a. UL 2162 for solid fuel-fired ovens.
 - b. UL 710 for commercial exhaust hoods
 19. USC Foundation for Cross-Connection Control and Hydraulic Research Standards: anti-siphonage/back flow preventers must be on the "List of Approved Backflow Prevention Assemblies" that is published by the Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California.

- B. Provider of Food Service Equipment Qualifications: The company or its sub-Trades shall:
1. Be regularly engaged in the supplying and installation of food service equipment of types, capacities, and sizes required by this contract, whose products have been in satisfactory use in similar service for not less than 5 years.
 2. Have technical personnel experienced in all aspects of procuring and installing the food service equipment specified here-in.
 3. Have the financial ability to handle this project and be able to provide documentation supporting their capacity to the Owner's satisfaction.
 4. Be regularly engaged in the manufacture of custom built food service equipment with the necessary facilities, manufacturing equipment and personnel to draw and manufacture food service equipment of the highest quality in accordance with the best accepted practices of the industry.
 5. Have successfully completed installations of similar size and complexity.
 6. Have expertise in field welding, finishing, and adjustment of equipment to fit field conditions with a neat and uniform installation per the best accepted practices of the industry.
- C. When requested by the Food Facility Consultant, bidding Provider of Food Service Equipment and its sub-Trades shall provide qualification information including a list of previous similar projects and their locations, the monetary size of each project contract and an Architect/Food Facility Consultant/Owner reference contact for each contract.

1.5 PROJECT CONDITIONS

- A. Delivery, Storage, Handling: New equipment shall be delivered in factory-fabricated containers designed to protect equipment and finish until final approval. Coordinate size of access and route to place of installation. Make arrangements to receive equipment at the project site. The Provider of Food Service Equipment is responsible for determining when construction activities are sufficiently complete to begin installations without risking damage to the equipment and for protection of the equipment until final approval.
- B. Site Visits: Food Service Equipment Provider shall visit site to:
1. Direct, check, and verify location of all rough ins
 2. Check framing and take all field measurements
 3. Make templates of field wall/floor conditions for accurate fabrication of equipment
 4. Supply and provide equipment to fit job conditions
 5. Direct Coordinating Trade(s)
- C. Equipment shall be consistent with these specifications and accompanying Drawings.
- D. All questions concerning this contract shall be directed to the Architect/Food Facilities Consultant.
- E. Install work as shown on Drawings. Examine job conditions and advise Architect/Food Facility Consultant in writing, before starting work, if any changes are required because of discrepancies between Specifications and Drawings and actual conditions.
- F. All equipment shall fit space provided and job conditions. Conditions causing major or unusual alteration to specified equipment shall be brought to the Architect's/Food Facilities Consultant's attention in writing, before equipment is constructed or installed. Minor adjustments of equipment to fit field conditions, including added length, are the responsibility of the Provider of Food Service Equipment and not grounds for an additional charge.
- G. It is the purpose of these Drawings and Specifications to procure Food Service Equipment, both special fabricated items and items of general manufacture that conform to the best operating policies of the industry. These items have been selected as preferred items as a result of past experiences in functional design, construction, material and in maintenance and repair.
- H. The bidding Food Service Equipment Provider is responsible for providing a bid amount for each piece of equipment shown or specified. If equipment specified has been discontinued, bidder shall submit a comparable piece for approval at least 10 days prior to the bid date. Manufacturer discontinuance does not relieve the bidder from providing a comparable piece of equipment.
- I. Buy-out or equipment of standard manufacture shall be of latest model or succeeding model at time of delivery and include all standard accessories as designated in the latest catalog.
- J. Non serial numbered equipment and equipment which does not require field measurement for accurate fabrication may be purchased following approval of shop Drawings and stored in its factory provided

packaging/crating in a bonded warehouse (per the requirements of Division 01) until the installation date. Installed equipment shall be like new without damage or physical deterioration. Warranties on all operational equipment items shall comply with 1.7 Warranty, paragraph D - Initiation of Warranty.

K. All equipment, except that designated as "Relocated" and "Existing", shall be provided with parts and accessories that are new and without previous use, and shall meet all conditions required for this project.

L. Equipment price increases not included in bidder's proposal will not be allowed after the bid opening.

1.6 COORDINATION

A. Coordinate the work of this contract with the work of other Trades at the project site and schedule the work with overall project progress.

1. Verify Coordinating Trade is aware of power pole locations, convenience outlets locations and circuit amperages required by the equipment.
2. Verify Coordinating Trade is aware of building component demolition required to allow for the installation of food service equipment.

B. This project involves the relocation and reuse of currently installed equipment; the Food Service Equipment Provider shall make itself completely aware of the requirements for removal of relocated equipment and the necessities for adapting and installing relocated equipment into the new facility.

C. Architectural, Plumbing, Mechanical, Electrical, and Food Service Requirements

1. It is the intent of this specification that the Food Service Equipment Provider will provide and supply all foodservice equipment and associated accessories, with the Trades responsible for mechanical, plumbing, and electrical work installing said accessories and providing all necessary materials and labor for all rough-in, inter-connections and final connections necessary for the proper operation of the equipment. The Food Service Equipment Provider shall oversee proper connections to the equipment.
2. The Trade(s) responsible for work in Architectural Divisions 02 through 14 (excluding Section 114000) will furnish materials, labor, and construction for surfaces adjacent to, surrounding, or abutting food service equipment specified herein, including, but not limited to, the following:
 - a. Walls, ceilings, floors, and their related finishes.
 - b. In wall blocking for wall supported equipment.
 - c. Sealing of unfinished concrete floors and masonry walls.
3. Plumbing Trade's Responsibility: Furnish labor and material to rough-in, interconnect, and make connections and interconnections to equipment as here-in specified, and as shown and noted on the contract document Drawings including but not limited to items designated as "G", "H", "C", "D", "IW". Provide complete, ready for use installation of items designated as "BY PC" and "BY PLUMBING TRADE". Test food service equipment internal piping systems for possible leaks incurred during shipping. Install hard piping and reducer fittings necessary to extend piping to connection points on the equipment. Disconnect equipment to be relocated or removed and reconnect as required. The Trade responsible for plumbing work shall install and connect equipment accessories supplied by the Provider of Food Service Equipment including, but not limited to, the following:
 - a. Miscellaneous fittings required for proper operation of equipment shown and specified, unless noted otherwise.
4. Mechanical Trade's Responsibility: The Trade responsible for mechanical work will furnish labor and material to rough-in, inter-connect and make connection to equipment as here-in specified and shown/noted on the contract document Drawings. Mechanical work shall comply with Division 23 of the specifications and shall include: the provision of air changes/ventilation of all kitchen-related spaces; the provision of exhaust and supply ductwork, flues, exhaust fans, supply fans, air balancing, related parts and accessories as required for proper operation of the equipment. Responsibility includes but is not limited to items designated "BY MC" and "BY MECHANICAL TRADE."
5. Electrical Trade's Responsibility: The Trade responsible for electrical work will rough-in, inter-connect and make connection /interconnection to equipment as herein specified and shown/noted on the contract document Drawings including but not limited to: connections to control/J-boxes designated as "EC" on the connection plan; provide final and ready for use installation of items designated "ER", "BY EC" and "BY ELECTRICAL TRADE"; inspect and tighten loose electrical connections caused by shipping. The Trade responsible for electrical work will install and/or connect/interconnect equipment accessories supplied by the Provider of Food Service Equipment including but not limited to:
 - a. Disconnect equipment to be relocated or removed and reconnect as required.

- b. Food guard mounted lights /heat strips and remote switching
 - c. Miscellaneous components required for proper operation of equipment shown and specified, unless noted otherwise.
 - d. The Electrical Trade's responsibility will include but is not limited to power poles, conduit, wiring, fittings, switches, line and disconnect switches, etc., as required for proper operation of the equipment. Electrical work shall comply with Division 26 of the specifications.
- 6. Food Service Contractor Responsibility: The Provider of Food Service Equipment shall supply for installation by other Trades the accessories noted in the work of other Trades above and as specified herein. The Provider of Food Service Equipment will provide /install the following food service equipment, ready for installation of accessories and utility connections /interconnections by the Plumbing, Mechanical and Electrical Trades:
 - a. Serving equipment, hot and refrigerated wells
- D. The manufacturer of food service equipment shall pre-wire or wire all new food service equipment and accessories to the designated "EC" control or junction box on the equipment for installation of accessories and connection /interconnection by the Trade responsible for electrical work, unless noted otherwise. The manufacturer of food service equipment shall extend plumbing and mechanical systems to a designated utility connection point on all new equipment for installation of accessories and final connection by the Trade(s) responsible for plumbing and mechanical work, unless noted otherwise.
- E. Supply each motor driven appliance or electrical heating unit with suitable starter of correct type or control switch in accordance with the UL listing. Provide motors with overload protection. All other line switches, fittings, and connections shall be furnished and installed by the Trade responsible for electrical work, except as otherwise specified.
- F. Internal wiring, electrical devices, controls, switches, etc., built into or forming an integral part of custom fabricated equipment shall be furnished and installed by the Trade responsible for electrical work. Said work shall be installed in electrical outlet/switch boxes provided in/on the equipment by the Provider of Food Service Equipment. All wiring /conduit above 34 inches AFF shall be routed in chases or shelf supports or otherwise concealed from view.
- G. Electrical cord lengths shall be suitable for installation conditions. Neatly coil and fasten excess cord length in place with approved nylon cable straps, clamps, or equally suitable device to insure against accident or damage to cords. Coil and strap excess cord length on all equipment.
- H. The Provider of Food Service Equipment shall verify and coordinate all plug types to assure proper mating with receptacles provided by the Trade responsible for electrical work.

1.7 WARRANTY

- A. The Food Service Equipment Provider shall fully guarantee /warranty all work and materials for a minimum period of one (1) year from date of acceptance.
- B. Provide five (5) year warranty for motor-compressor at each remote or self-contained condensing unit supplied with buy-out or custom fabricated refrigeration equipment provided under this Contract.
- C. Extended warranties and conditions of service on items of standard manufacture, as established by manufacturer of such equipment, shall apply where extending beyond warranty and conditions of service set forth in these Specifications. Provide manufacturer's written warranty to the Owner when any guarantee or warranty extends beyond the above-mentioned one (1) year warranty period.
- D. Initiation of warranty period shall occur on the First Day of Effective Use of equipment by the Owner. First Day of Effective Use will be the first day, following substantial completion acceptance, that the kitchen is used to serve a full meal. Equipment start-up and testing by the Food Service Equipment Provider, its subcontractors, service agents or other parties /Trades responsible for setup or connections, will not start the warranty period. Substantial Completion Acceptance of food service equipment shall not be interpreted to be the initiation of the warranty period unless it falls within 30 days prior to the First Day of Effective Use. Food Service Equipment Provider shall notify Food Service Consultant/Architect in writing at least 10 days prior to bid date of Manufacturers who are not accepting of this policy. Rejection of this policy is grounds for disallowance of manufacturer's equipment. Manufacturer's equipment which is bid is understood to be in acceptance of this policy.

- E. Immediately upon written notice from Owner, and as directed, the Provider of Food Service Equipment agrees to repair or replace, without cost to Owner, defects in workmanship of materials not due to abuse appearing within above mentioned time. Trips to job for servicing of equipment under guarantee shall be made without charge, but such trips shall be made only at the direction of Owner or Owner's previously identified agent.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. The food service equipment bid shall quote only the manufacturers listed within the specification or addenda. Hereinafter, where specific mention is made of catalog number of any particular manufacturer or Trade name, it shall be understood that such mention is made for purpose of establishing type, design and/or quality of material and equipment desired. Food Facilities Consultant will review equipment submitted by other than specified manufacturers for acceptance as an equivalent to the specified equipment if submitted no later than 10 days prior to the bid date. All equipment submitted must meet or exceed the quality, design, and function of the specified equipment. The food service equipment bidder requesting review of the alternative manufacturer shall submit complete construction details, brochures and comparison sheets to the equipment specified. If the submitted equipment varies in size from the specified or will require any changes in the shown mechanical, electrical, ventilation or structural building systems, the bidder shall call these to the Architect's/Food Facility Consultant's attention in considering the submitted equipment. The bidder making such submission shall cover all costs for any modifications to equipment, mechanical, plumbing, electrical, ventilation or structural systems which may be necessary. Such equipment will be either approved, approved with requisites, or rejected and noted as such in the last addenda issued. Only equipment which is specified or approved as equivalent by addenda may be bid.

2.2 LIST OF EQUIPMENT

- A. Following is a detailed list of all equipment in the new food service area to be a part of this contract or provided by the Owner or its Vendor(s). All electrical equipment is 60 Hz. All items utilizing electrical power shall be UL or CSA listed.
- B. Refer to accompanying Food Service Equipment Drawings for required equipment quantities and utility configurations.
- C. Use of the terms "standard", "standard construction", "specification of standard" refer to construction techniques, materials, methods, and configurations specified in "Specification of Standard for Custom Fabricated or Modified Equipment" within this Section.
- D. Reference 1.2 - SUMMARY for terminology definitions.

ITEM NO. A1 - SERVING UNIT; (3) WELL HOT, (2) PAN COLD REQUIRED

- A. Provide Piper model 3HF-2BCM MOD Elite Serving Unit, electric, overall 88"L x 28"D x 36"H, with three (3) sealed hot wells, each 6-1/2"D with coved corners, and a two (2) pan size, 9-7/16"D mechanically cooled cold unit. Each hot well to be provided with a thermostatically controlled 1000w element. Mobile modular design, 14 ga. stainless steel top with 1-1/2" turndown on all sides, 20 ga. stainless steel front & end panels, 18 ga. stainless steel bottom shelf. Provide with louvered panels for ventilation of condensing unit. Cold pan has 1" drain with 3/4" FPT shut off valve; hot well drains manifolded standard. 5" swivel plate casters (2 with brakes). Provide with the following alterations and options:
 - 1. Provide each well with an individual drain and valve. Manifold drains and extend to staff side with single master valve which is easily accessible from staff side. Owner will drain wells to a bucket.
 - 2. Omit locking mechanisms
 - 3. Omit doors
 - 4. SCB: Stainless steel cutting board, 8" wide
 - 5. SRTS: Solid Ribbed Tray Slide, 12" wide; mount at 34" AFF
 - 6. FRMA: Laminate finish, customer side only; color to be selected at submittal phase
 - 7. One (1) BPG1C-46-HEAT Classic Buffet Style Protector Guard with end guards and Heat Strip over hot wells
 - 8. One (1) BPG1C-32-LED Classic Buffet Style Protector Guard with end guards and LED Light Strip over cold pan

ITEM NO. A2 - SERVING UNIT; W/ (2) BUILT-IN HEATED SHELVES REQUIRED

- A. Provide Piper model 6ST MOD Elite Utility Serving Counter, 88"L x 28"D x 36"H, with two (2) Hatco GRSBF-36-S built-in heated shelves with flush tops. Mobile modular design, 14 ga. stainless steel top with 1-1/2" turndown on all sides, 20 ga. stainless steel front & end panels, 18 ga. stainless steel bottom shelf. 5" swivel plate casters (2 with brakes). Provide with the following alterations and options:
 1. Omit locking mechanisms
 2. Omit doors
 3. SCB: Stainless steel cutting board, 8" wide
 4. SRTS: Solid Ribbed Tray Slide, 12" wide; mount at 34"AFF
 5. FRMA: Laminate finish, customer side only; color to be selected at submittal phase
 6. Two (2) BPG1C-46-HEAT Classic Buffet Style Protector Guards with end guards and Heat Strip over heated shelves

**ITEM NO. A3 - SERVING UNIT; (3) WELL HOT, (2) PAN COLD
REQUIRED**

- A. Provide Piper model 3HF-2BCM MOD Elite Serving Unit, electric, overall 88"L x 28"D x 36"H, with (3) sealed hot wells, each 6-1/2"D with coved corners, and a two (2) pan size, 9-7/16"D mechanically cooled cold unit. Each hot well to be provided with a thermostatically controlled 1000w element. Mobile modular design, 14 ga. stainless steel top with 1-1/2" turndown on all sides, 20 ga. stainless steel front & end panels, 18 ga. stainless steel bottom shelf. Provide with louvered panels for ventilation of condensing unit. Cold pan has 1" drain with 3/4" FPT shut off valve; hot well drains manifolded standard. 5" swivel plate casters (2 with brakes). Provide with the following alterations and options:
 1. Provide each hot well with an individual drain and valve. Manifold drains and extend to staff side with single master valve which is easily accessible from staff side. Owner will drain wells to a bucket.
 2. Omit locking mechanisms
 3. Omit doors
 4. SCB: Stainless steel cutting board, 8" wide
 5. SRTS: Solid Ribbed Tray Slide, 12" wide; mount at 34"AFF
 6. FRMA: Laminate finish, customer side only; color to be selected at submittal phase
 7. One (1) BPG1C-46-HEAT: Classic Buffet Style Protector Guard with end guards and Heat Strip over hot wells
 8. One (1) BPG1C-32-LED: Classic Buffet Style Protector Guard with end guards and LED Light Strip over cold pan

**ITEM NO. A4 - SERVING UNIT; (2) WELL HOT, (5) PAN COLD
REQUIRED**

- A. Provide Piper model 2HF-5BCM MOD Elite Serving Unit, electric, overall 108"L x 28"D x 36"H, with two (2) sealed hot wells, each 6-1/2"D with coved corners, and a five (5) pan size, 9-7/16"D mechanically cooled cold unit. Each hot well to be provided with a thermostatically controlled 1000w element. Mobile modular design, 14 ga. stainless steel top with 1-1/2" turndown on all sides, 20 ga. stainless steel front & end panels, 18 ga. stainless steel bottom shelf. Provide with louvered panels for ventilation of condensing unit. Cold pan has 1" drain with 3/4" FPT shut off valve; hot well drains manifolded standard. 5" swivel plate casters (2 with brakes). Provide with the following alterations and options:
 1. Provide each hot well with an individual drain and valve. Manifold drains and extend to staff side with single master valve which is easily accessible from staff side. Owner will drain wells to a bucket.
 2. Omit locking mechanisms
 3. SD: Sliding doors
 4. Two (2) SRTS: Solid Ribbed Tray Slides, 12" wide; mount at 34"AFF
 5. FRMA: Laminate finish; color to be selected at submittal phase
 6. BPGC-LED: Classic Double-sided Buffet Style Protector Guard with end guards, hinging tempered glass, and LED light strip. Provide in custom length (approximately 106") as required to extend full length of serving unit. Locate intermediate supports between hot wells and cold pan as shown on the drawings.

**ITEM NO. A5 - CASHIER STAND
REQUIRED**

- A. Provide Piper 2-CD Elite Cashier's Serving Counter, overall 30"L x 28"D x 36"H. 14-gauge stainless steel top with 1-1/2" turndown on all sides; top secured by four recessed bolts for easy access; 20-gauge stainless steel end and front panels; grommeted hole in top for wire access; locking utility drawer centered on open side mount on roller bearing slides. 5" swivel plate casters (2 with brakes). Provide with the following alterations and options:
 1. Omit locking mechanisms
 2. Omit solid bottom
 3. TFR: Tubular foot rest
 4. Two (2) SRTS: Solid Ribbed Tray Slides, 12" wide; mount at 34"AFF

5. FRMA: Laminate finish; color to be selected at submittal phase
6. Route electrical and data lines from power pole into knee space and up through standard hole (with bushing) in top.

ITEM NO. A6 - CHAIR
BY OWNER

ITEM NO. A7 – SERVING UNIT; SOLID TOP
REQUIRED

- A. Provide Piper 4-ST (500-2) Elite Solid Top Unit, overall 60"L x 28"D x 36"H. 14 ga. stainless steel top with 1-1/2" turndown on all sides, 20 ga. stainless steel front & end panels, 18 ga. stainless steel bottom shelf. 5" swivel plate casters (2 with brakes). Provide with the following alterations and options:
 1. Omit locking mechanisms
 2. SRTS: Solid Ribbed Tray Slide, 12" wide; mount at 34"AFF
 3. Provide two holes (with bushing) through top where indicated on the drawings for routing of power cords to wall receptacles.

ITEM NO. B1 – CHEST FREEZER
EXISTING TO BE RELOCATED

- A. Existing General Electric model FCM5SHBWW to be relocated.

ITEM NO. B2 – FROZEN BEVERAGE MACHINE
EXISTING TO BE RELOCATED

- A. Existing Ronnoco model 0751204015E to be relocated.

ITEM NO. B3 - MILK COOLER
EXISTING TO BE RELOCATED

- A. Existing ModuServe model MCT-DM3 to be relocated.

ITEM NO. B4 – REFRIGERATED SELF-SERVICE CASE
EXISTING TO BE RELOCATED

- A. Existing Structural Concepts model CO47R to be relocated.

ITEM NO. B5 - REFRIGERATED SELF-SERVICE CASE
EXISTING TO BE RELOCATED

- A. Existing Structural Concepts model CO67R to be relocated.

ITEM NO. C1 – DISPENSER; SELF-LEVELING TRAY
REQUIRED

- A. Provide Piper Mobile Tray Dispenser, solid bottom, self-leveling, double stack, holds (300) 10-3/4" x 15-1/4" trays, with corner bumpers, stainless steel all tubular frame, NSF. With self-lubricating Delrin wheels and stainless steel extension springs, field adjustable to accommodate different weights. With removable stainless steel carrier trays, non-marking corner bumpers, and four 4" heavy-duty non-marking swivel casters.
 1. Food service equipment provider shall adjust leveling springs for the Owner's designated trays

ITEM NO. C2 – CART; SILVER
REQUIRED

- A. Provide Caddy T-414 Tray & Silver Caddy, 19"W x 22-1/2"D x 45"H, single stack, (8) cylinder-type silverware dispensers, shelf holds (195) trays up to 15" x 20", stainless steel tubular frame, rounded edges, 4" swivel casters, NSF. Provide with the following options:
 1. ACC-38: Circular bumpers (set of 4)
 2. ACC-41: Caster brakes (pair)

ITEM NO. D1 – SHELIVING; MOBILE MERCHANDISING
BY VENDOR

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The Provider of Food Service Equipment must examine roughed-in mechanical and electrical services, installation of floors, walls, columns, and ceilings, and other conditions under which food service work is to be installed and must verify dimensions of services and substrates before fabricating work. Notify Coordinating Trade of unsatisfactory locations and dimensions of other work and of unsatisfactory conditions for proper installation of food service equipment. Do not proceed with fabrication and installation until unsatisfactory dimensions and conditions have been corrected in manner satisfactory to installer.
- B. Set each item of non-movable, non-mobile and non-portable equipment securely in place, level, plumb, and adjusted to correct height. Adjust counter tops and other work surfaces to a level tolerance of 1/16-inch maximum offset, and maximum variation from level or indicated slope of 1/16-inch per foot. Dish tables shall slope to the dish machine, disposal, or trough for positive drainage.
- C. Install equipment with access and maintenance clearances that comply with manufacturer's written installation instructions and requirements of authorities having jurisdiction.
- D. Install closure-trim strips and similar items requiring fasteners in a bed of sealant.
- E. Install joint sealant in joints between equipment and abutting surfaces with continuous joint backing unless Item specification indicates otherwise. Produce airtight, watertight, vermin-proof, easily cleanable, sanitary joints.
- F. Punch List Inspection Requirements: Food Service Equipment is not ready for punch list inspection until the following have been completed for ALL EQUIPMENT.
 - 1. All set in place per plan (mobile and stationary).
 - 2. All equipment unpacked and assembled with all protective packaging, papers and films removed.
 - 3. All sealants and sound deadening applied.
 - 4. All plumbing, mechanical and electrical connections completed.
 - 5. All equipment with cord /plug sets plugged in.
 - 6. All operational equipment turned on and tested for operation.
 - 7. All cleaned of dirt/dust/debris and fabrication markings.
 - 8. All packing /packaging and installation fittings removed from the food service areas.
 - 9. All equipment completed per these specifications and food service Drawings.
 - 10. Requests for a punch list inspection prior to completion of these requirements will not be honored. Punch list inspections made by the Food Facility Consultant based on false representation of completion by the Provider of Food Service Equipment or Coordinating Trade will be billed to the Food Service Equipment Provider for time, travel, meals, and related visit expenses.

3.2 CLEANING AND PROTECTING

- A. Remove all debris from equipment and site, accumulated by delivery and installation of all equipment in this Contract.
- B. Restoration: After completion of installation, and completion of other major work in food service areas, remove protective coverings, if any, and clean food service equipment, internally and externally. Restore exposed and semi-exposed finishes to remove abrasions and other damages; polish exposed metal surfaces and touch-up painted surfaces. Replace work which cannot be successfully restored.
- C. Final Cleaning: Clean and sanitize food service equipment and leave in condition ready for use in food service. Cover food service equipment with 4-mil polyethylene film as protective cover.

3.3 DEMONSTRATION

- A. Testing: Delay start-up of food service equipment until utilities services have been tested, balanced, and adjusted for pressure, voltage, and similar considerations; and until water and steam lines have been cleaned and treated for sanitation. Before testing, lubricate each equipment item in accordance with manufacturer's recommendations. The Food Service Equipment Provider, with its own personnel or those of a service agency, shall turn on and test all functions of each item of operational equipment, **PRIOR TO THE SUBSTANTIAL COMPLETION PUNCH LIST INSPECTION AND OWNER DEMONSTRATION**, in order to assure that it is operating properly, and that controls and safety devices are functioning. Repair or replace equipment, **PRIOR TO THE SUBSTANTIAL**

COMPLETION PUNCH LIST INSPECTION AND OWNER DEMONSTRATION, which is found to be defective in its operation, including units which are below capacity or operating with excessive noise or vibration.

- B. Instruct Owner's operating personnel in the proper operation and maintenance procedures for each new item of operational food service equipment. **PRIOR TO THE SUBSTANTIAL COMPLETION PUNCH LIST INSPECTION AND OWNER DEMONSTRATION**, start and burn-off all equipment as necessary. Food Service Equipment Provider shall demonstrate full operation and prepare a minimum of one food item (on cooking equipment) with each piece of operational equipment for demonstration and proper installation verification to the Owner. Menu and food will be by the Owner. Refer to Division01 Section.

END OF SECTION 114000

SECTION 122113 - HORIZONTAL LOUVER BLINDS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Horizontal louver blinds with aluminum slats.
- B. Related Sections include the following:
 - 1. Section 061000 "Rough Carpentry" for wood blocking and grounds for mounting roller shades and accessories.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include styles, material descriptions, special feature descriptions and operating instructions.
- B. Shop Drawings: Show fabrication and installation details for horizontal louver blinds, including: elevations, sections, details and dimensions not shown in Product Data. Show installation details, mountings, attachments to other work/adjacent construction and operational clearances.
- C. Samples for Initial Selection: For each type and color of horizontal louver blind indicated.
 - 1. Include similar Samples of accessories involving color selection.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For horizontal louver blinds to include in maintenance manuals. Include precautions for cleaning materials and methods that may be detrimental to finishes and performance.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain horizontal louver blinds through one source from a single manufacturer.
- B. Fire-Test-Response Characteristics: Provide horizontal louver blinds with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Flame-Resistance Ratings: Passes NFPA 701.
- C. Product Standard: Provide horizontal louver blinds complying with WCSC A 100.1.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver horizontal louver blinds in factory packages, marked with manufacturer and product name, lead-free designation, and location of installation using same designations indicated on Drawings and in a window treatment schedule.
- B. Store materials off ground in dry enclosed space and under cover.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install horizontal louver blinds until construction and wet and dirty 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 horizontal louver blinds are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operable glazed units' operation hardware throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.7 WARRANTY

- A. Submit written guarantee for louver blinds covering workmanship and materials, signed jointly by manufacturer and installer.
 - 1. Louver blind shall have a Life Time warranty.

PART 2 PRODUCTS

2.1 HORIZONTAL LOUVER BLINDS, ALUMINUM SLATS (122113.A01)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Levolor; Custom Mark 1 Metal Blinds, or a comparable product by one of the following:
 - 1. Hunter Douglas.
 - 2. Other manufacturers meeting specified requirements.
- B. Slats: Aluminum; alloy and temper recommended by producer for type of use and finish indicated; with crowned profile and radiused corners.
 - 1. Width: 1 inch.
 - a. Spacing: 21 mm.
 - 2. Thickness: Not less than 0.008 inch.
 - 3. Finish: One color, as selected by Architect from manufacturer's full color offering of standard and custom colors.
 - a. Ionized Coating: Antistatic, dust-repellent, baked polyester finish.
- C. Headrail: Head rail shall be 1 inch high by 1-1/2 inch wide by 0.025 inches thick u shaped, formed steel or extruded aluminum; long edges returned or rolled; fully enclosing operating mechanisms on three sides and end plugs and the following:
 - 1. Capacity: One blind per headrail.
- D. Bottom Rail: Formed-steel or extruded-aluminum tube, with plastic or metal capped ends top contoured to match crowned shape of slat; with enclosed ladders and tapes to prevent contact with sill.
- E. Ladders: Evenly spaced to prevent long-term slat sag.
 - 1. For Blinds with Nominal Slat Width 1 Inch or Less: Braided string.
 - 2. Ladders shall be dyed to match slat color or be a complimentary color acceptable to Architect.
- F. Lift Cords: Manufacturer's standard.
- G. Tilt Control: Enclosed worm-gear mechanism, slip clutch or detachable wand preventing over-rotation, and linkage rod, and the following:
 - 1. Tilt Operation: Manual with clear plastic wand.
 - 2. Length of Tilt Control: Manufacturer's standard.
 - 3. Tilt: Full.
- H. Lift Operation: Manual, with low-friction cord locking mechanism. Mechanism shall be "crash-proof" type and shall lock automatically upon release of cord.
 - 1. Provide blinds with cord control so that blinds can have variable positions.
 - 2. Provide blinds with "ring pulls" in lieu of tassels. Provide with cord of adequate length so that bottom of ring pull is 5'-4" above finished floor. Where headrail is below 6'-0" above finished floor, provide 4" cord length.
- I. Tilt-Control and Cord-Lock Position: Right and left side of headrail, respectively, unless otherwise indicated.
- J. Valance: Manufacturer's standard.
 - 1. Finish Color Characteristics: Match color, texture, pattern, and gloss of slats.

- K. Mounting: Wall mounting between jambs, permitting easy removal and replacement without damaging blind or adjacent surfaces and finishes; with spacers and shims required for blind placement and alignment indicated.
 - 1. Provide intermediate support brackets if end support spacing exceeds spacing recommended by manufacturer for weight and size of blind. Mounting brackets and accessories shall be colored to match headrail/valance.
 - 2. Provide receiver clip on bottom of blinds to secure bottom of blind to sill substrate.
- L. Colors, Textures, Patterns, and Gloss: As selected by Architect from manufacturer's full range.

2.2 HORIZONTAL LOUVER BLIND FABRICATION

- A. Concealed Components: Non-corrodible or corrosion-resistant-coated materials.
 - 1. Lift-and-Tilt Mechanisms: With permanently lubricated moving parts.
- B. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at 74 deg F:
 - 1. Blind Units Installed between (inside) Jambs: Width equal to 1/4 inch per side or 1/2 inch total, plus or minus 1/8 inch, less than jamb-to-jamb dimension of opening in which each blind is installed. Length equal to 1/4 inch, plus or minus 1/8 inch, less than head-to-sill dimension of opening in which each blind is installed.
 - 2. Blind Units Installed outside Jambs: Width and length as indicated, with terminations between blinds of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
- C. Installation Brackets: Designed for easy removal and reinstallation of blind, for supporting headrail, valance, and operating hardware, and for hardware position and blind mounting method indicated.
- D. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to blind hardware and adjoining construction; type designed for securing to supporting substrate; and supporting blinds and accessories under conditions of normal use.
- E. Color-Coated Finish:
 - 1. Metal: For components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.
- F. Component Color: Provide rails, cords, ladders, and exposed-to-view metal and plastic matching or coordinating with slat color, unless otherwise indicated.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install horizontal louver blinds level and plumb and aligned with adjacent units according to manufacturer's written instructions, and located so exterior slat edges in any position are not closer than 2 inches to interior face of glass. Install intermediate support as required to prevent deflection in headrail. Allow clearances between adjacent blinds and for operating glazed opening's operation hardware if any.
- B. Jamb Mounted: Install headrail recessed into opening to within 1/2 inch of window frame and flush to head of opening.

3.3 ADJUSTING, CLEANING AND PROTECTION

- A. Adjust horizontal louver blinds to operate smoothly, easily, safely, and free of binding or malfunction throughout entire operational range.
- B. Clean horizontal louver blind surfaces after installation, according to manufacturer's written instructions.
- C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that horizontal louver blinds are without damage or deterioration at time of Substantial Completion.
- D. Replace damaged horizontal louver blinds that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION 122113

SECTION 122413 - ROLLER WINDOW SHADES

PART 1 GENERAL

1.1 SUMMARY

- A. This Section includes the following types of roller shades:
 - 1. Manually operated roller shades with single rollers (122413.A01).
 - 2. Motor operated roller shades with single rollers (122413.A02).
- B. Related Sections include the following:
 - 1. Section 012300 "Alternates" for alternates effecting work of this Section.
 - 2. Section 061000 "Rough Carpentry" for wood blocking and grounds for mounting roller shades and accessories.
 - 3. Section 079200 "Joint Sealants" for sealing the perimeters of installation accessories for light-blocking shades with a sealant.
 - 4. Division 26 Electrical for power connections for motorized shades.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, 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. Show location and type of each roller shade.
 - 1. Include elevations, sections details, and dimensions not shown in Product Data.
 - 2. Include operational clearances, attachments to and relationship to adjoining work.
 - 3. Motor-Operated Shades: Include details of installation and diagrams for power, signal, and control wiring.
- C. Samples for Initial Selection: For each type and color of shadeband material.
 - 1. Include Samples of accessories involving color selection.
 - 2. Include 4 inch square, actual samples of each type of shadeband material for Architect's selection.
- D. Samples for Verification: For each type of roller shade.
 - 1. Shadeband Material: Not less than 10 inches square. Mark interior face of material if applicable.
 - 2. Roller Shade: Full-size operating unit, not less than 16 inches wide by 36 inches long for each type of roller shade indicated.
 - 3. Installation Accessories: Full-size unit, not less than 10 inches long.
- E. Product Schedule: For roller shades. Use same designations indicated on Drawings.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of shadeband material.
- C. Product Test Reports: For each type of shadeband material, for tests performed by a qualified testing agency.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roller shades to include in maintenance manuals. Include the following:
 - 1. Methods for maintaining roller shades and finishes.
 - 2. Precautions about cleaning materials and methods that could be detrimental to fabrics, finishes, and performance.
 - 3. Operating hardware.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. Source Limitations: Obtain roller shades through one source from a single manufacturer.
- C. Fire-Test-Response Characteristics: Provide roller shade band materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. Flame-Resistance Ratings: Passes NFPA 701.
- D. Product Standard: Provide roller shades complying with WCMA A 100.1.
- E. Anti-Microbial Characteristics: 'No Growth' per ASTM G21 results for fungi ATCC9642, ATCC9644 AND ATCC9645.
- F. Field Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver shades in factory packages, marked with manufacturer and product name, lead-free designation, and location of installation using same designations indicated on Drawings.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install roller shades 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 roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operable glazed units' operation hardware throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Roller Shades: Full-size units equal to 2 percent of quantity installed for each size, color, and shadeband material indicated, but not fewer than two units.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product for Manually Operated Roller Shades: Subject to compliance with requirements, provide MechoShade Systems, Inc.; "Mecho/5X" or a comparable product by one of the following:
 - 1. Draper Inc.
 - 2. Nysan Solar Control Systems.

- B. Basis-of-Design Product for Motor Operated Roller Shades (122413.A02): Subject to compliance with requirements, provide MechoShade Systems, Inc.; "Electro/2" or a comparable product by one of the following:
 - 1. Draper Inc.
 - 2. Lutron Electronics Company, Inc.
 - 3. Springs Window Fashions.
- C. Source Limitations: Obtain roller shades from single source from single manufacturer.

2.2 MANUALLY OPERATED SHADES WITH SINGLE ROLLERS (122413.A01)

- 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: Stainless steel with Shock Absorber System.
 - a. Loop Length: Full length of roller shade.
 - b. Limit Stops: Provide upper and lower ball stops.
 - 1) Provide limit stops with Shock Absorber System reducing chain stress, consisting of a 3/4" rubber sleeve, 3/8 inch stop beads and washers to prevent shade from being raised or lowered too far.
 - 2) Clutch mechanism: Fabricated from POM thermoplastic with welded 0.354 inch (9 mm) primary steel post with rotational bearing, overrun design, and positive mechanical engagement of drive mechanism to tube. White or Black color as selected by Architect. Center bead chain placement for right or left hand operation and accommodates side channel with no adjustment of chain location.
 - c. Chain-Retainer Type: Chain tensioner, jamb mounted.
 - 2. Spring Lift-Assist Mechanisms: When recommended by roller shade manufacturer for proper operation of shade, provide manufacturer's standard for balancing roller-shade weight and lifting heavy roller shades.
 - a. Provide for shade bands that weigh more than 10 lb or for shades as recommended by manufacturer, whichever criteria are more stringent.
- B. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shade bands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shade bands for service.
 - 1. Roller Drive-End Location: Right side of inside face of shade or left side of inside face of shade as determined by Architect.
 - 2. Direction of Shadeband Roll: Regular, from back of roller.
 - 3. Shadeband-to-Roller Attachment: Manufacturer's standard method.
- C. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.
- D. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.
- E. Shadebands:
 - 1. Shadeband Material: Light-filtering fabric.
 - a. Types:
 - 1) Light filtering shades 1% openness: Enclosed in sealed pocket of shadeband material.
 - 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
 - a. Color and Finish: As selected by Architect from manufacturer's full range.
- F. Installation Accessories:
 - 1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
 - a. Shape: L-shaped.
 - b. Height: Manufacturer's standard height required to conceal roller and shadeband when shade is fully open.
 - 2. Exposed Headbox:
 - a. Description: Rectangular, extruded-aluminum enclosure including the following:
 - 1) Front fascia with integral bottom closure.
 - 2) Top and back covers.
 - 3) Endcaps.

- 4) Removable bottom closure.
- b. Height: Manufacturer's standard height required to enclose roller and shadeband when shade is fully open, but not less than 3 inches, and not more than 8 inches.
3. Endcap Covers: As required by manufacturer, provide to cover exposed endcaps.
4. Side Channels: With light seals and designed to eliminate light gaps at sides of shades as shades are drawn down. Provide side channels with shadeband guides or other means of aligning shadebands with channels at tops.
5. Bottom (Sill) Channel or Angle: With light seals and designed to eliminate light gaps at bottoms of shades when shades are closed.
6. Installation Accessories Color and Finish: As selected from manufacturer's full range.

2.3 MOTOR-OPERATED, SINGLE-ROLLER SHADES (122413.A02)

- 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.
 - b. Basis of Design: WhisperShade IQ2.
 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. Keyed Control Station: Keyed, maintained-contact, three-position, switch-operated control station with open, close, and off functions. Provide two keys per station. (At Commons only).
 - b. Color: As selected by Architect from manufacturer's full range.
 4. Crank-Operator Override: Crank and gearbox operate shades in event of power outage or motor failure.
 5. Limit Switches: Adjustable switches interlocked with motor controls and set to stop shades automatically at fully raised and fully lowered positions.
 6. Operating Features:
 - a. Group switching with integrated switch control; single faceplate for multiple switch cutouts.
 - b. Capable of interface with audiovisual control system.
 - c. Capable of accepting input from building automation control system.
 - d. Override switch.
- B. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
 1. Roller Drive-End Location: Right side of inside face of shade as determined by Architect.
 2. Direction of Shadeband Roll: Regular, from back of roller.
 3. Shadeband-to-Roller Attachment: Manufacturer's standard method.
- C. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.
- D. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers that are operated by one roller drive-end assembly.
- E. Shadebands:
 1. Shadeband Material: Light-filtering fabric.
 - a. Types:
 - 1) Light filtering shades 1% openness: Enclosed in sealed pocket of shadeband material.
 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
 - a. Color and Finish: As selected by Architect from manufacturer's full range.
- F. Installation Accessories:
 1. Exposed Headbox: Rectangular, extruded-aluminum enclosure including front fascia, top and back covers, endcaps, and removable bottom closure.
 - a. Description:

- 1) Front fascia with integral bottom closure.
- 2) Top and back covers.
- 3) Endcaps.
- 4) Removable bottom closure.
- b. Height: Manufacturer's standard in height required to enclose roller and shadeband when shade is fully open, but not less than 4 inches, and not more than 8 inches.
2. Endcap Covers: As required by manufacturer to cover exposed endcaps.
3. Installation Accessories Color and Finish: As selected from manufacturer's full range.

2.4 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. Light-Filtering Fabric: Visually transparent, woven non-raveling single-fabric, stain and fade resistant shadecloth.
 1. Basis-of-Design Product for Light Filtering Shadeband (Fabric): Subject to compliance with requirements, provide MechoShade Systems, Inc.; "ThermoVeil" 1700 Series (1% Open), or comparable product from other roller shade manufacturers submitted to and accepted by Architect prior to bidding.
 2. Source: Roller-shade manufacturer.
 3. Type: Woven from extruded vinyl yarn comprised of 21 percent polyester and 79 percent reinforced vinyl.
 4. Thickness: 0.030 inch.
 5. Weight: Manufacturer's standard.
 6. Roll Width: Manufacturer's standard width up to 126 inches.
 7. Orientation on Shadeband: As indicated on Drawings.
 8. Openness Factor: 3 percent.
 9. Color: As selected by Architect from manufacturer's full range.

2.5 ROLLER SHADE FABRICATION

- A. Product Description: Roller shade consisting of a roller, a means of supporting the roller, a flexible sheet or band of material carried by the roller, a means of attaching the material to the roller, a bottom bar, and an operating mechanism that lifts and lowers the shade.
- B. Concealed Components: Non-corrodible or corrosion-resistant-coated materials.
 1. Lifting Mechanism: With permanently lubricated moving parts.
- C. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at 74 deg F:
 1. Shade Units Installed Outside Jamb: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
- D. Installation Brackets: Designed for easy removal and reinstallation of shade, for supporting headbox, roller, and operating hardware and for hardware position and shade mounting method indicated.
- E. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to shade hardware and adjoining construction; type designed for securing to supporting substrate; and supporting shades and accessories under conditions of normal use.
- F. Color-Coated Finish: For metal components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.
- G. Colors of Metal and Plastic Components Exposed to View: As selected by Architect from manufacturer's full range, unless otherwise indicated.
- H. 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.
- I. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:
 1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch per side or 1/2-inch total, plus or minus 1/8 inch. Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch, plus or minus 1/8 inch.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, accurate locations of connections to building electrical system, and other conditions affecting performance.
 - 1. Blocking at roller shade locations shall be confirmed to be 3/4 inch wood blocking or greater prior to installation.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ROLLER SHADE INSTALLATION

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions and located so shade band is not closer than 4 inches to interior face of glass. Allow clearances for window operation hardware.
 - 1. Opaque Shadebands: Located so shadeband is not closer than 2 inches to interior face of glass. Allow clearances for window operation hardware.
 - 2. For room darkening (blackout) roller shades, install side channels and bottom hem bar with integral light seal in accordance with roller shade manufacturer's written instructions and as acceptable to Architect.
- B. Electrical Connections: Connect motor-operated roller shades to building electrical system.
- C. Roller Shade Locations: Refer to Drawings.

3.3 ADJUSTING, CLEANING AND PROTECTION

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
- B. Clean roller shade surfaces after installation, according to manufacturer's written instructions.
- C. 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.
- D. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain motor-operated roller shades.

END OF SECTION 122413

SECTION 123200 - MANUFACTURED WOOD CASEWORK

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Plastic-laminate-faced wood cabinets of stock design.
 - 2. Base Cabinet (123200.A01).
 - 3. Sink Base (123200.A10).
 - 4. ADA Sink Base (123200.A11).
 - 5. Tall Cabinet (123200.A21).
 - 6. Wall Cabinet (123200.A31).
 - 7. Filler (123200.A81).
 - 8. Finished End (123200.A82).
 - 9. End Panel (123200.A83).
 - 10. Apron (123200.A84).
 - 11. Cabinet Locks (123200.A91).
- B. Related Sections:
 - 1. Section 012300 "Alternates" for those alternates effecting work of this Section.
 - 2. Section 061000 "Rough Carpentry" for wood blocking for anchoring manufactured wood casework.
 - 3. Section 064023 "Interior Architectural Woodwork" for custom plastic-laminate-clad casework, countertop brackets.
 - 4. Section 092116 "Non-Structural Metal Framing" for reinforcements in metal-framed partitions for anchoring casework.
 - 5. Section 096513 "Resilient Base and Accessories" for resilient base applied to manufactured wood casework.
 - 6. Section 123666 "Solid Surfacing Countertops".

1.2 DEFINITIONS

- A. Definitions in the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" apply to the work of this Section.
- B. Balanced Construction: Where exposed face of a panel is surfaced with high pressure plastic laminate and the opposite (back) surface shall receive a balanced product equal in thickness to the face of the panel.
 - 1. Note: Color for interior is not required to match color and pattern of exterior face laminate.
- C. Casework: Modular casework of this Section is that which is pre-manufactured to standard dimensions or sizes. Casework fabricated as part of Section 064023 "Interior Architectural Woodwork" is that which is custom fabricated to suit a particular project.
- D. Concealed Portions of Cabinets: Surfaces not usually visible after installation, including sleepers, web frames, dust panels, and ends and backs that are placed directly against walls or other cabinets.
- E. MDF: Medium-density fiberboard.
- F. Hardwood Plywood: A panel product composed of layers or plies of veneer, or of veneers in combination with lumber core, hardboard core, MDF core, or particleboard core, joined with adhesive, and faced both front and back with hardwood veneers.
- G. Exposed Portions of Cabinets: Surfaces visible when doors and drawers are closed, including bottoms of cabinets more than 48 inches above floor, and surfaces visible in open cabinets and behind glass doors.
 - 1. Ends of cabinets installed directly against walls or other cabinets shall not be considered as exposed.
- H. Semi-exposed Portions of Cabinets: Surfaces behind opaque doors, such as interiors of cabinets, shelves, dividers, interiors and sides of drawers, and interior faces of doors. Tops of cases 78 inches or more above floor are defined as semi-exposed.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated, submit data describing materials, fabrication, hardware accessories, and installation instructions.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Indicate types, sizes and finishes of cabinets and countertops.
 - 2. Indicate types and locations of hardware.
 - 3. Indicate locations and types of service fittings.
 - 4. Show fabrication details; including locations and sizes for cutouts and holes for plumbing fixtures, science equipment and other items installed in casework.
 - 5. Indicate locations of blocking and reinforcements required for installing casework.
 - 6. Include details of utility spaces showing supports for conduits and piping.
 - 7. Show installation details, including field joints and filler panels.
 - 8. Indicate locations of and clearances from adjacent walls, doors, windows, and other building components.
 - 9. As applicable, indicate manufacturer's catalog numbers for casework.
- C. Samples for Initial Selection: For cabinet finishes and for each type of top material indicated.
- D. Samples for Verification: 8-by-10-inch Samples for each type of finish, including top material.
 - 1. Exposed hardware, one unit for each type.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer. Furnish qualification data for Installer, if different from manufacturer.
- B. Keying Schedule: Include schematic keying diagram and index each key set to unique designations that are coordinated with the Contract Documents.
- C. Certifications: Submit documentation verifying use of "No added formaldehyde" and "marine grade plywood" were incorporated into the work of this Section, as acceptable to and when requested by Architect.
- D. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer with not less than seven years of successful experience, under the current company name, in producing manufactured casework similar to that required for this Project.
- B. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- C. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.
- D. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project. Installer must have completed projects of similar size and scope to this project in the last 5 years.
- E. Source Limitations: Obtain manufactured wood casework from single source from single manufacturer.
- F. Quality Standard: Unless otherwise indicated, comply with the AWI's and WI's "Architectural Woodwork Standards" for grades of casework indicated for construction, finishes, installation, and other requirements.
 - 1. Grade: Custom.
 - 2. 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.
- G. Product Designations: Drawings indicate sizes, configurations, and finish material of manufactured wood casework. Other manufacturers' casework of similar sizes and door and drawer configurations, of same finish

material, and complying with the Specifications may be considered as noted below. Refer to Section 012500 "Substitution Procedures" and Section 016000 "Product Requirements."

1. Other manufacturers proposing comparable products shall submit the following for Architect's verification:
 - a. One full-size finished base cabinet complete with hardware, doors, and drawers.
 - b. One full-size finished wall cabinet complete with hardware, doors, and adjustable shelves.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver manufactured wood casework only after painting, utility roughing-in, and similar operations that could damage, soil, or deteriorate casework have been completed in installation areas. If casework must be stored in other than installation areas, store only in areas where environmental conditions meet requirements specified in "Project Conditions" Article.
- B. Keep finished surfaces covered with polyethylene film or other protective covering during handling and installation.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install manufactured wood casework 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.
- B. Field Measurements: Verify actual dimensions of construction contiguous with manufactured wood casework by field measurements before fabrication.
 1. Casework manufacturer is responsible for details and dimensions not controlled by job conditions. Show all required field measurements beyond manufacturer's control on shop drawings.
 2. Locate concealed framing, blocking, and reinforcements that support casework by field measurements before being enclosed, and indicate measurements on Shop Drawings.

1.8 COORDINATION

- A. Coordinate layout and installation of framing and reinforcements in walls and partitions for support of manufactured wood casework.
- B. Coordinate installation of laboratory casework with installation of fume hoods and other laboratory equipment.
- C. Coordinate layout and installation of work of this Section with electrical and plumbing contractors. Coordinate installation so as not to interfere with plumbing and electrical work associated with casework.
- D. Keying Conference: Conduct conference at Project site. Incorporate keying conference decisions into final keying requirements.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of manufactured wood casework that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Delamination of components or other failures of glue bond.
 - b. Warping of components.
 - c. Failure of operating hardware.
 - d. Deterioration of finishes.
 2. Warranty Period: Three years from date of Substantial Completion.

PART 2- PRODUCTS

2.1 PLASTIC LAMINATE FACED CASEWORK MANUFACTURERS

- A. Manufacturers for Plastic-Laminate-Faced Manufactured Casework: Subject to compliance with requirements, provide products by one of the following:
 - 1. Basis-of-Design Product: Casework as manufactured by Stevens Industries; Stevens Advantage.
 - 2. Other Manufacturers: Manufacturers list below are required to meet requirements set forth in this Section. Manufacturing procedures may need to be modified for compliance and technical data on casework construction must be submitted for verification. Other manufactures include, but are not limited to:
 - a. TMI Systems Design Corporation.
 - b. Case Systems.
 - c. LSI
 - d. Precision Craft.

2.2 PLASTIC-LAMINATE-CLAD CASEWORK

- A. Drawings indicate sizes, configurations, and finish material of manufactured wood casework from Stevens Industries. Models selected include, but are not limited to, the following:
 - 1. Base Cabinet (123200.A01): Provide casework
 - a. #10441 -2 Drawer, 2 Door Base Cab.
 - 2. Sink Base (123200.A10).
 - a. #10479 – False Front, 2 Door Base Cab. – Base.
 - 3. ADA Sink Base (123200.A11).
 - a. #10586 – ADA Sink Base – Trimmable
 - 4. Tall Cabinet (123200.A21).
 - a. Tall Cabinet with Adjustable Shelves(123200.A21): Premanufactured unit fabricated to sizes indicated. Unit shall be plastic laminate clad and with two doors, a center divider and five shelves, one of which is fixed and the other four adjustable.
 - 1) Basis of Design: Steven's Advantage model #25129.
 - 5. Wall Cabinet (123200.A31).
 - a. #15129– 2 Door Wall Cab. – Adjustable Shelves
 - 6. Filler (123200.A81).
 - a. #10803.
 - b. #10805.
 - c. #15803.
 - d. #25803
 - 7. Finished End (123200.A82).
 - 8. End Panel (123200.A83).
 - a. #10954.
 - 9. Cabinet Locks (123200.A91).
 - a. Drawer and Hinged Door Locks: Provide cam-type locks by COMPX Timberline.
 - b. Provide a minimum of two keys per lock and six master keys. Key alike by room.
 - c. Provide locks on all doors and drawers.
 - d. Inactive door shall receive barrel bolt and strike plate.
- B. Source Limitations: Obtain plastic-laminate-faced cabinets from single manufacturer.

2.3 MATERIALS, GENERAL

- A. Certified Wood: Wood products shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001 and FSC STD-40-004.
- B. Composite Wood Products: Products shall be made using ultra-low-emitting formaldehyde resins as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or shall be made with no added formaldehyde.

- C. Maximum Moisture Content for Lumber: 7 percent for hardwood and 12 percent for softwood.
- D. Softwood Plywood: DOC PS 1, with no added formaldehyde (NAUF).
- E. Particleboard: ANSI A208.1, Grade M-2, with no added formaldehyde (NAUF).
 - 1. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- F. MDF: ANSI A208.2, Grade 130, with no added formaldehyde (NAUF).
 - 1. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- G. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3.
 - 1. Colors: Refer to Material Finish Legend on drawings for basis of design products.
- H. Thermoset Decorative Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.
- I. Edge Banding for Plastic Laminate: Rigid PVC extrusions, through color with satin finish, 3 mm thick at doors, drawer fronts and laminate countertops, 1 mm thick elsewhere.
 - 1. 3mm edge banding shall be machine-applied and set with hot-melt glue.
 - 2. Edge banding colors shall match a solid color of adjacent laminate surface, unless noted otherwise, as determined by Architect. Colors shall not be limited to casework manufacturer's standard stocked colors, but will be selected by Architect from any color group offered by Canplast, Rehau and Doellken-Woodtape.
- J. Edgebanding for Thermoset Decorative Panels: Unless otherwise specified, provide PVC or polyester edge banding complying with LMA EDG-1 and matching thermoset decorative panels.
- K. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.4 CABINET MATERIALS

- A. Exposed Cabinet Materials:
 - 1. Plastic Laminate: Grade HGS for horizontal surfaces and VGS for vertical surfaces.
 - 2. Unless otherwise indicated, provide specified edge banding on all exposed edges.
- B. Semiexposed Cabinet Materials:
 - 1. Plastic Laminate: Grade VGS.
 - a. Provide plastic laminate for semi-exposed surfaces unless otherwise indicated.
 - 1) Color for backs of doors and drawers shall match a solid color of that of cabinet box interior, as determined by Architect. Facings shall be balanced as required by AWI construction guidelines for grade level indicated.
 - 2. Unless otherwise indicated, provide specified edge banding on all semi-exposed edges.
- C. Concealed Cabinet Materials:
 - 1. Thermoset decorative panels.

2.5 DESIGN, COLOR, AND FINISH

- A. Design: Provide manufactured wood casework of the following design:
 - 1. Flush overlay.
- B. Thermoset Decorative Panel Colors, Patterns, and Finishes: As selected by Architect from casework manufacturer's full range.
- C. Plastic-Laminate Colors, Patterns, and Finishes: As indicated by manufacturer's designations on Drawings.
- D. PVC Edgebanding Color: As selected from casework manufacturer's full range, including pre-formulated colors.

- E. Solid Surfacing: As noted on drawings. Where not specifically indicated, as selected by Architect from manufacturer's full range.

2.6 CABINET FABRICATION

- A. Plastic-Laminate-Faced Cabinet Construction: As required by referenced quality standard, but not less than the following:
 - 1. Assembly method for cabinets shall utilize "European" assembly screws (threaded steel dowel pins), similar to Hafele "Conformat". At manufacturer's option, alternate doweled assembly methods may be used if in accordance with AWI guidelines and requirements for grade level indicated.
 - 2. Cabinets boxes below sinks shall be fabricated from plywood and shall receive white plastic laminate on the interior.
 - 3. Bottoms and Ends of Cabinets, and Tops of Wall Cabinets and Tall Cabinets: 3/4-inch particleboard, plastic-laminate faced on exposed surfaces, thermoset decorative panels on semi-exposed surfaces.
 - 4. Shelves: Thermoset decorative panels; 3/4-inch thick for spans up to 32 inches and 1-inch thick for spans up to 48 inches.
 - 5. Open Shelves: 3/4-inch particleboard, plastic-laminate faced on exposed surfaces for spans up to 32 inches and 1-inch thick for spans up to 48 inches.
 - 6. Backs of Cabinets: 1/2-inch particleboard or 1/4-inch MDF, plastic-laminate faced on exposed surfaces, thermoset decorative panels on semi-exposed surfaces. Backs shall be captured in a 1/2-inch dado and set back 3/4-inch to accommodate 3/4-inch thick nailers.
 - 7. Drawer Fronts: 3/4-inch particleboard, plastic-laminate faced exposed face and balanced backer.
 - 8. Drawer Sub-fronts, Sides and Backs:
 - a. 1/2-inch single-species solid-wood or veneer-core hardwood (Birch) plywood, with glued dovetail or multiple dowel joints.
 - b. 1/2-inch, high density fiberboard, 55 pcf density minimum. All parts glued and mechanically fastened using thermosetting fasteners.
 - c. 1/2-inch, high density melamine composite panels. All parts glued and mechanically fastened using thermosetting fasteners.
 - d. Fabricate file drawers and lateral file drawers of width and depth necessary to accommodate hanging file rack system.
 - 9. Drawer Bottoms: 1/4-inch thermoset decorative panels glued and dadoed into front, back, and sides of drawers. Use 1/2-inch material for drawers more than 24 inches wide.
 - 10. Doors: 3/4-inch particleboard or MDF, plastic-laminate faced.
 - 11. Removable Backs: Provide backs that can be removed from within cabinets at utility spaces.
 - 12. Cabinets Bases: Bases shall be fabricated separate from cabinets (not integral). Fabricate from 3/4-inch exterior marine grade plywood or preservative-treated 2x4's with marine-grade plywood face. Fabricate in a ladder configuration with plywood fronts and back running continuous for the length of the cabinet. Provide ends, and provide additional runners centered in all cabinets greater than 24 inches wide.
- B. Filler Strips: Provide as needed to close spaces between cabinets and walls, between cabinets and floors, ceilings, and indicated equipment. Fabricate from same material and with same finish as cabinets.
 - 1. Provide top and bottom fillers and corner panels to close gaps and openings.

2.7 CASEWORK HARDWARE AND ACCESSORIES

- A. Hardware, General: Unless otherwise indicated, provide manufacturer's standard satin-finish, commercial-quality, heavy-duty hardware.
 - 1. Use threaded metal or plastic inserts with machine screws for fastening to particleboard except where hardware is through-bolted from back side.
 - 2. Provide caps on fasteners at cabinet interiors in color to match adjacent cabinet finish color.
- B. Butt Hinges: Chrome-plated, semiconcealed, 5-knuckle hinges complying with BHMA A156.9, Grade 1, with antifriction bearings and hospital tips. Provide 2 hinges for doors less than 48 inches high and 3 hinges for doors more than 48 inches high.
- C. Frameless Concealed Hinges (European Type): 120 degrees of opening, self-closing. Provide two hinges for doors less than 48 inches high, and provide three hinges for doors more than 48 inches high.
 - 1. Basis-of-Design: Blum #71T5580 hinges and Blum hinge plate #174H7100E.

- D. Pulls:
 - 1. Solid aluminum or chrome-plated wire pulls, fastened from back with two screws. Provide 2 pulls for drawers more than 24 inches wide.
 - a. Basis of Design: Provide Hafele "116.05.931" matt aluminum handle.
 - 1) Diameter: 128mm.
- E. Door Catches: Zinc-plated, dual, self-aligning, permanent magnet catch. Provide 2 catches on doors more than 48 inches high.
- F. Drawer Slides: BHMA A156.9, Type B05091.
 - 1. Heavy Duty (Grade 1HD-100): Side mounted; full-extension type; zinc-plated, steel ball-bearing slides. Provide with manufacturer's standard metal rear brackets as applicable.
 - a. Basis-of-Design: GSlide Corporation/Knape & Vogt Mfg. Co.; #GS4200.
- G. Hanging File Rails: Manufacturer's standard hanging file rail system. Provide integral system at all base cabinet drawers with dimensions that will accommodate hanging files.
 - 1. At 36" wide base file cabinets, provide rails on front and back for standard legal side filing. Provide two (2) removable crossbars per drawer for optional letter/legal front-to-back filing.
- H. Adjustable Shelf Supports: 2-pin locking plastic shelf rests complying with BHMA A156.9, Type B04013.
- I. Chain Stops: Provide at all swinging doors that are withing 6 inches of a perpendicular wall.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of framing and reinforcements, and other conditions affecting performance of manufactured wood casework.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 CASEWORK INSTALLATION

- A. General: Install cabinets to comply with same grade as item to be installed.
- B. Install level, plumb, and true; shim as required, using concealed shims. Where manufactured wood casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.
- C. Base Cabinets: Set cabinets straight, level, and plumb. Adjust subtops within 1/16 inch of a single plane. Fasten cabinets to masonry or framing, wood blocking, or reinforcements in walls and partitions with fasteners spaced 24 inches o.c. Bolt adjacent cabinets together with joints flush, tight, and uniform. Align similar adjoining doors and drawers to a tolerance of 1/16 inch.
 - 1. Where base cabinets are not installed adjacent to walls, fasten to floor at toe space with fasteners spaced 24 inches o.c. Secure sides of cabinets to floor, where they do not adjoin other cabinets, with not less than two fasteners.
- D. Wall Cabinets: Hang cabinets straight, level, and plumb. Adjust fronts and bottoms within 1/16 inch of a single plane. Fasten to hanging strips, masonry, or framing, blocking, or reinforcements in walls or partitions. Align similar adjoining doors to a tolerance of 1/16 inch.
 - 1. Fasten through back, near top and bottom, at ends, and not more than 16 inches o.c.
 - 2. Use toggle bolts at hollow masonry.
 - 3. Use expansion anchors at solid masonry.
 - 4. Use No. 10 wafer-head screws sized for 1-inch penetration at wood hanging strips.
 - 5. Use No. 10 wafer-head screws sized for 1-inch penetration into wood blocking.
 - 6. Use No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish at metal-framed partitions.
- E. Fasten cabinets to adjacent cabinets and to masonry, framing, wood blocking, or reinforcements in walls and partitions to comply with the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."

- F. Install hardware uniformly and precisely. Set hinges snug and flat in mortises unless otherwise indicated. Adjust and align hardware so moving parts operate freely and contact points meet accurately. Allow for final adjustment after installation.
- G. Adjust casework and hardware so doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

3.3 INSTALLATION OF SHELVING

- A. Securely fasten shelf standards to masonry, partition framing, wood blocking, or reinforcements in partitions.
 - 1. Fasten shelf standards at ends and not more than 12 inches () o.c.
 - 2. Use toggle bolts at hollow masonry.
 - 3. Use expansion anchors at solid masonry.
 - 4. Use self-tapping sheet metal screws in metal framing or metal backing at metal-framed partitions. Do not use wall anchors in gypsum board.
 - 5. Use wood screws sized for 1-inch () penetration into wood blocking.
 - 6. Use toggle bolts at plaster on metal lath.
- B. Install shelf standards plumb and at heights to align shelf brackets for level shelves. Space standards not more than 36 inches o.c.
- C. Install shelving level and straight, closely fitted to other work where indicated.

3.4 CLEANING AND PROTECTING

- 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 plastic or other suitable water-resistant covering over countertop surfaces. Tape to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.

END OF SECTION 123200

SECTION 123666 - SOLID SURFACING COUNTERTOPS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Solid surface material countertops (123666.A01).
 - 2. Solid surface material backsplashes and end splashes (123666.A03).
 - 3. Solid surface material sills (123666.A05).
 - 4. Solid surface material wall caps (123666.A09).
- B. Related Requirements:
 - 1. Section 012300 "Alternates" for those alternates related to work of this Section.
 - 2. Section 061000 "Rough Carpentry" for blocking as required.
 - 3. Section 064023 "Interior Architectural Woodwork" for conceal bracket.
 - 4. Section 064023 "Interior Architectural Woodwork" for custom casework.
 - 5. Section 079200 "Joint Sealants" for countertop sealants.
 - 6. Section 123200 "Manufactured Wood Casework" for premanufactured casework.
 - 7. Division 22 "Plumbing" for non-integral sinks and plumbing fittings.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated, submit data describing materials, fabrication, hardware accessories, and installation instructions.
- B. Shop Drawings: Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures, as applicable.
 - 1. Show locations and details of joints.
 - 2. Show direction of directional pattern, if any.
- C. Samples for Initial Selection: For each type of material exposed to view.
- D. Samples for Verification: For the following products:
 - 1. Countertop material, 6 inches square.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For solid surface material countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop with not less than seven years of experience, under the current company name, that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Fabricator of products or manufacturer's authorized representative who is trained and approved for installation of units required for this Project. Installer must have completed 7 projects of similar size and scope to this project in the last 5 years.

- C. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and execution.
 - 1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Protect solid surfacing during transit, delivery, storage and handling to prevent damage, soiling and deterioration.
- B. Do not deliver solid surfacing, until painting, wet work, grinding and similar operations which could damage, soil or deteriorate solid surfacing which have been completed in installation areas

1.7 FIELD CONDITIONS

- A. Field Measurements: Where work of this Section is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work. Verify dimensions by field measurements before fabrication is complete.
 - 1. Locate concealed framing, blocking, and reinforcements that support casework by field measurements before being enclosed, and indicate measurements on Shop Drawings.

1.8 COORDINATION

- A. Solid surfacing subcontractor shall coordinate with the mechanical & electrical contractors to assure proper working clearances, receptacle/fixture locations, and all connection/fittings necessary to function properly.
- B. Coordinate locations of utilities that will penetrate countertops [,transaction counters] or backsplashes.
- C. Coordinate layout and installation of framing and reinforcements in walls and partitions for support of work of this Section.

PART 2 PRODUCTS

2.1 SOLID SURFACE COUNTERTOP MATERIALS

- A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.
 - 1. Type: Provide Standard type unless Special Purpose type is indicated.
 - 2. Colors and Patterns: As indicated by manufacturer's designations on Material Finish Legend.
- B. Particleboard: ANSI A208.1, Grade M-2, except at countertops with sinks, provide Grade M-2-Exterior Glue.
- C. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.
- D. Basis-of-Design Product: Subject to compliance with requirements, provide LX Hausys "Hi-Macs" Solid Surface or comparable product from an available manufacturer submitted to and accepted by Architect prior to bidding:

2.2 COUNTERTOP FABRICATION

- A. General: Provide countertops on all casework 60" or less in height. Provide back and end splashes when top abuts a wall, column or casework of a higher elevation. Splash shall be 4" high, unless otherwise noted. Splash shall terminate at face of adjoining casework. No back or end splash on free standing items, unless otherwise noted.
 - 1. Silicone clear caulk joint between backsplash and top.
 - 2. Solid surfacing subcontractor shall cut all necessary openings/holes in countertops for the various trades. Templates shall be provided by the various trades.
 - 3. At all Countertop cut openings, brush clear polyurethane on all exposed plywood.

- B. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."
 - 1. Grade: Premium.
- C. Configuration:
 - 1. Front: Straight, slightly eased at top.
 - 2. Backsplash: Straight, slightly eased at corner.
 - 3. End Splash: Matching backsplash, as applicable.
 - 4. Sills: Straight, slightly eased at top.
- D. Countertops: 1/2-inch- thick, solid surface material with front edge built up with same material.
- E. Backsplashes: 1/2-inch- thick, solid surface material.
- F. Fabricate in one piece, unless otherwise indicated. Comply with solid surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.
- G. Fabricate tops with shop-applied edges unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
 - 1. Fabricate with loose backsplashes for field assembly.
 - 2. Install integral sink bowls in countertops in the shop. Ease edge or chamfer edge at sink to countertop connection.
- H. Joints: Fabricate countertops (up to 10 feet in length) without joints.
- I. Joints: Fabricate countertops (greater than 10 feet in length) in sections for joining in field.
 - 1. Joint Locations: Not within 18 inches of a sink or cooktop and not where a countertop section less than 36 inches long would result, unless unavoidable.
 - 2. Splined Joints: Where narrow strips of solid surface material between joints occur to form large openings, provide splined joints. Accurately cut kerfs in edges at joints for insertion of metal splines to maintain alignment of surfaces at joints. Make width of cuts slightly more than thickness of splines to provide snug fit.
- J. Cutouts and Holes:
 - 1. Undercounter Plumbing Fixtures: Make cutouts for fixtures in shop, to best extent possible, using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
 - a. Provide vertical edges, slightly eased at juncture of cutout edges with top and bottom surfaces of countertop and projecting 3/16 inch into fixture opening.
 - b. Provide vertical edges, rounded to 3/8-inch radius at juncture of cutout edges with top surface of countertop, slightly eased at bottom, and projecting 3/16 inch into fixture opening.
 - c. Provide 3/4-inch full bullnose edges projecting 3/8 inch into fixture opening.
 - 2. Counter-Mounted Plumbing Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
 - 3. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

2.3 ACCESSORIES

- A. Wire-Management Grommets (123666.A11): Circular, molded-plastic grommets and matching plastic caps with slot for wire passage.
 - 1. Cable Passage through Grommet for Countertops: 2-1/2-inch OD, molded-plastic grommet with flip top matching plastic caps with slot for wire passage. Color as selected by Architect.
 - a. Basis-of-Design Product: Doug Mockett and Company, Inc.; Model EDP3.

2.4 INSTALLATION MATERIALS

- A. Adhesive: Product recommended by solid surface material manufacturer.
- B. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."

- C. Fasteners: Provide non-corrosive fasteners as required for complete installation of components and assemblies. Type and size shall be as required for conditions, materials and superimposed loads involved.
- D. Accessories: Comply with manufacturer's recommendations for hardware, non-corrosive fasteners, adhesives, sealers, fabrication and finishing.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates to receive solid surface material countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install countertops level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.
- B. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
- C. Secure countertops to subtops with adhesive according to solid surface material manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- D. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
 - 1. Install metal splines in kerfs in countertop edges at joints as specified. Fill kerfs with adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.
 - 2. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.
- E. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.
- F. Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Predrill holes for screws as recommended by manufacturer.
- G. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
 - 1. Seal edges of cutouts in particleboard and plywood subtops by saturating with varnish.
- H. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

END OF SECTION 123666

SECTION 142400 - HYDRAULIC ELEVATORS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes
 - 1. Machine-room-less, holeless hydraulic passenger elevators (142400.A01).
 - 2. Hydraulic Elevator Modernization Kit.
- B. Related Requirements:
 - 1. Section 015000 "Temporary Facilities and Controls" for temporary use of elevators for construction purposes.
 - 2. Section 042000 "Unit Masonry" for setting sleeves, inserts, and anchoring devices in masonry and for grouting elevator entrance frames installed in masonry walls.
 - 3. Section 055000 "Metal Fabrications" for the following:
 - a. Attachment plates and angle brackets for supporting guide-rail brackets.
 - b. Hoist- safety-beams.
 - c. Structural-steel shapes for subsills.
 - d. Pit ladders.
 - 4. Section 271500 "Communications Horizontal Cabling" for telephone service for elevators.
 - 5. Section 283111 "Digital, Addressable Fire-Alarm System" for smoke detectors in elevator lobbies to initiate emergency recall operation and heat detectors in shafts and machine rooms to disconnect power from elevator equipment before sprinkler activation and for connection to elevator controllers.

1.2 DEFINITIONS

- A. Definitions in ASME A17.1/CSA B44 apply to work of this Section.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include capacities, sizes, performances, operations, safety features, finishes, and similar information.
 - 2. Include Product Data for car enclosures, hoistway entrances, and operation, control, and signal systems.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment.
 - 2. Include large-scale layout of car-control station and standby power operation control panel.
 - 3. Indicate maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.
- C. Samples for Initial Selection: For each type of exposed finish involving color selection.
- D. Samples for Verification: For exposed car; 3-inch-square Samples of sheet materials; and 4-inch lengths of running trim members.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service as shown and specified, are adequate for elevator system being provided.
- C. Sample Warranty: For special warranty.

- D. Seismic Qualification Certificates: When required by Code and Authority having Jurisdiction, submit seismic qualification certificates for elevator equipment, accessories, and components, from manufacturer.
 - 1. **[VERIFY - RARE]**
 - 2. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 3. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 4. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.
 - 1. Submit manufacturer's or Installer's standard operation and maintenance manual, according to ASME A17.1/CSA B44, including diagnostic and repair information available to manufacturer's and Installer's maintenance personnel.
- B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.
- C. Continuing Maintenance Proposal: Submit a continuing maintenance proposal from Installer to Owner, in the form of a standard two-year maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Elevator manufacturer or an authorized representative who is trained and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials, components and equipment in manufacturer's protective packaging. Store materials, components, and equipment off of ground, under cover, and in a dry location.

1.8 COORDINATION

- A. Coordinate installation of sleeves, block outs, elevator equipment with integral anchors, and other items that are embedded in concrete or masonry for elevator equipment. Furnish templates, sleeves, elevator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.
- B. Coordinate locations and dimensions of other work relating to hydraulic elevators including pit ladders; sumps and floor drains in pits; entrance subsills; electrical service; and electrical outlets, lights, and switches in hoistways and pits.

1.9 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair, restore, or replace elevator work that fails in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
 - 2. Warranty Period: Two (2) years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product (142400.A01): Subject to compliance with requirements, provide ThyssenKrupp Elevator Americas; "Endura MRL", Twinpost Above-ground, Two-stage, Telescopic holeless and machine-room-less elevator; or comparable product by one of the following, meeting specified requirements:
1. **[BoD - REVISE ABOVE TO SUIT PROJECT]**
 2. Otis Elevator
 3. Schindler Elevator Corp.
- B. **[BOD for PARK HILL_ STANDARD]** Basis-of-Design Product (142400.A01): Subject to compliance with requirements, provide MEI Total Elevator; "Twin Jack Holeless Passenger Elevator", Twinpost Above-ground, 2-stage Telescopic holeless and machine-room-less elevator.
1. Comparable products by other manufacturers will be considered when submitted to and accepted by Architect prior to bidding.

2.2 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with ASME A17.1/CSA B44.
- B. Accessibility Requirements: Comply with Section 407 in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and with ICC A117.1.
- C. Seismic Performance: When required by Code for seismic risk zone where Project is located, elevator system manufacturer shall design/engineer the elevator system to withstand the effects of earthquake motions determined according to ASCE/SEI 7 and shall comply with elevator safety requirements for seismic risk zone, determined by the elevator manufacturer and applicable for the project location in ASME A17.1/CSA B44.
1. **[VERIFY - RARE]**

2.3 ELEVATORS

- A. Elevator System, General: Manufacturer's standard elevator systems. Unless otherwise indicated, manufacturers' standard components shall be used, as included in standard elevator systems and as required for complete system.
- B. Elevator Description: **[ThyssenKrupp]**
1. Type: **[One-Stage, holeless and machine-room-less (travel height up to 12'-8")]** Two-Stage, holeless and machine-room-less (travel height up to 23'-2-1/2") **[Three-Stage, holeless and machine-room-less (travel height up to 33'-6-1/2")]**.
 - a. **[VERIFY TRAVEL HEIGHT WITH ARCHITECT]**
 2. Stops: 2 stops, all in alignment. Approximate travel distance 14 feet and 8 inches.
 - a. **[CONFIRM NUMBER OF STOPS AND TRAVEL DISTANCE]**
 3. Rated Load: 2100 lbs., minimum.
 - a. **[BoD FOR PASSENGER ELEVATORS IN SCHOOLS, VERIFY FOR HIGHER ED]**
 - b. **[OPTIONS FOR LOAD ARE: [2500] [3000] [3500] [4000] [4500] [5000]]**
 4. Rated Speed: 100 fpm.
 5. Operation System: Single, selective-collective automatic operation.
 - a. **[VERIFY ABOVE]**
 6. Auxiliary Operations:
 - a. Battery-powered lowering.
 - b. Automatic operation of lights and ventilation fans.
 7. Security Features: Card-reader operation. Card reader shall be mounted adjacent to hall call station.
 8. Car Enclosures:
 - a. Inside Width: Not less than 6'-6", minimum from side wall to side wall.
 - 1) **[VERIFY BASED ON ELEVATOR CAPACITY]**
 - b. Inside Depth: Not less than 5'-5" from back wall to front wall (return panels).
 - 1) **[VERIFY BASED ON ELEVATOR CAPACITY]**

- c. Inside Height: Not less than 7'-4", minimum inches to underside of ceiling.
- d. Front Walls: Satin stainless steel, No. 4 finish.
- e. Front Wall Return Panels and Door Frame: Full-width wrap-around type; Satin stainless steel, No. 4 finish.
- f. Car Fixtures: Satin stainless steel, No. 4 finish.
- g. Side and Rear Wall Panels: Plastic laminate.
- h. Wall Base: Front, sides and rear wall shall have manufacturer's standard stainless steel, No. 4 finish.
- i. Reveals: Satin stainless steel, No. 4 finish.
- j. Doors: Front opening, right or left hand as indicated [for stretcher compliance per the IBC].
- k. Door Faces (Interior): Stainless steel, No. 4 finish.
- l. Door Sills: Nickel silver.
- m. Ceiling: Suspended type, with white translucent diffusers, LED lighting and powder-coated frame.
- n. Handrails: 1-1/4-inch diameter continuous, brushed stainless steel with satin finish, at sides and rear of car.
- o. Floor prepared to receive resilient luxury vinyl tile flooring.
- 9. Hoistway Entrances:
 - a. Width: 42 inches.
 - b. Height: 84 inches.
 - c. Type: Single-speed side sliding. Architect to select hand (RH or LH).
 - d. Frames: Satin stainless steel, No. 4 finish.
 - e. Doors: Satin stainless steel, No. 4 finish.
 - f. Sills: Nickel silver.
- 10. Hall Fixtures: Satin stainless steel, No. 4 finish.
- 11. Additional Requirements:
 - a. Provide inspection certificate in each car, mounted under acrylic cover with frame made from satin stainless steel, No. 4 finished.
 - b. Operation Systems shall communicate with owner provided security access control
- 12. Pit Depth: 6 feet, minimum.
 - a. **[[CONFIRM PIT DEPTH W/ ARCHITECT, CODE NOW REQUIRES SPECIAL CLEARANCE]]**

C. Elevator Description: **[BOD for PARK HILL_ CONFIRM SIZES_BELOW FOR ELEMENTARY]**

- 1. Type: Two-Stage, holeless and machine-room-less.
- 2. Stops: 2 stops, all in alignment. Approximate travel distance as indicated on Drawings.
- 3. Rated Load: 2100 lb. minimum.
- 4. Rated Speed: ~~80 to 160 fpm~~ Up to 100 fpm. **[[VERIFY]]**
- 5. Operation System: Single automatic.
- 6. Auxiliary Operations:
 - a. Battery-powered lowering.
 - b. Automatic operation of lights and ventilation fans.
- 7. Car Enclosures:
 - a. Inside Width: Not less than 5 foot 9 inches from side wall to side wall. **[[VERIFY SIZE]]**
 - b. Inside Depth: Not less than 4 foot 3-1/2 inches from back wall to front wall (return panels). **[[VERIFY SIZE]]**
- 8. Inside Height: Not less than 8 foot 0 inches to underside of ceiling.
 - a. Front Walls: Plastic laminate to match **PL1**.
 - b. Front Wall Return Panels and Door Frame: Full-width wrap-around type; Satin stainless steel, No. 4 finish.
 - c. Car Fixtures: Satin stainless steel, No. 4 finish.
 - d. Side and Rear Wall Panels: Plastic Laminate to match **PL1**.
 - e. Reveals: Satin stainless steel, No. 4 finish.
 - f. Door Faces (Interior): Satin stainless steel, No. 4 finish.
 - g. Door Sills: Aluminum, mill finish.
 - h. Ceiling: Suspended type, with white translucent diffusers, LED lighting and powder-coated frame.
 - 1) Basis of Design shall be "Type K" by MEI Total Elevator Solutions.
 - i. Handrails: Cylindrical continuous, satin stainless steel, No. 4 finish, at sides and rear of car.
 - j. Floor prepared to receive carpet as indicated on Material Finish Legend.
- 9. Hoistway Entrances:
 - a. Width: 42 inches. **[[VERIFY SIZE]]**
 - b. Height: 84 inches.
 - c. Type: Single-speed side sliding. Architect to select hand (RH or LH).
 - d. Frames: Satin stainless steel, No. 4 finish.

- e. Doors: Satin stainless steel, No. 4 finish.
- f. Sills: Satin stainless steel, No. 4 finish.
- g. Hall Fixtures: Satin stainless steel, No. 4 finish.
- 10. Additional Requirements:
 - a. Provide inspection certificate in each car, mounted under acrylic cover with frame made from satin stainless steel, No. 4 finished.
 - b. Provide hooks for complete set(s) of full-height protective pads.
 - c. **Provide additional wiring package to accomodate camera and public address system to travel with the cab.**
 - 1) **Rough in two (2) conductors for the public adress system speakers.**
 - 2) **Rough in wo (2) conductors for the camera.**
 - d. Pit Depth: ~~6 feet~~**4'-0"**, minimum.
 - 1) **[[CONFIRM PIT DEPTH W/ ARCHITECT, CODE NOW REQUIRES SPECIAL CLEARANCE]]**

2.4 SYSTEMS AND COMPONENTS

- A. Pump Units: Positive-displacement type with a maximum of 10 percent variation between no load and full load and with minimum pulsations.
 - 1. Pump shall be submersible type with submersible squirrel-cage induction motor, and shall be suspended inside oil tank from vibration isolation mounts or shall be tank-top-mounted type with fan-cooled, squirrel-cage induction motor, and shall be mounted on oil tank with vibration isolation mounts and enclosed in prime-painted steel enclosure lined with 1-inch thick, glass-fiber insulation board.
 - 2. Motor shall have solid-state starting.
 - 3. Motor shall have variable-voltage, variable-frequency control.
- B. Hydraulic Silencers: System shall have hydraulic silencer containing pulsation-absorbing material in blowout-proof housing at pump unit.
- C. Piping: Size, type, and weight of piping as recommended by elevator manufacturer, with flexible connectors to minimize sound and vibration transmissions from power unit.
 - 1. Cylinder units shall be connected with dielectric couplings.
 - 2. Casing for Underground Piping: If any, shall be Schedule 40 PVC pipe complying with ASTM D 1785, joined with PVC fittings complying with ASTM D 2466 and solvent cement complying with ASTM D 2564.
- D. Hydraulic Fluid: Elevator manufacturer's standard fire-resistant fluid with additives as needed to prevent oxidation of fluid, corrosion of cylinder and other components, and other adverse effects.
- E. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work. Device installation is specified in another Section.
- F. Car Frame and Platform: Welded steel units.
- G. Guides: Sliding guides with guide-rail lubricators. Provide guides at top and bottom of car and counterweight frames.

2.5 OPERATION SYSTEMS

- A. General: Provide manufacturer's standard microprocessor operation system as required to provide type of operation indicated.
- B. Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevators where indicated:
 - 1. Single-Car Battery-Powered Lowering: When power fails, car is lowered to the lowest floor, opens its doors, and shuts down. System includes rechargeable battery and automatic recharging system.
 - 2. Automatic Operation of Lights and Fan: When elevator is stopped and unoccupied with doors closed, lighting, ventilation fan, and cab displays are de-energized after five minutes and are re-energized before car doors open.
- C. Security features shall not affect emergency firefighters' service.
 - 1. Card-Reader Operation: System uses card readers at hall push-button stations to authorize calls. Security system determines which landings and at what times calls require authorization by card reader. Provide

required conductors in traveling cable and panel for interconnecting card readers, other security access system equipment, and elevator controllers.

a. **[[VERIFY IF CARD READERS ARE REQUIRED VS KEY OR NO KEY]]**

b. Security access system equipment is specified in Section 281500 "Access Control Hardware Devices."

2.6 DOOR REOPENING DEVICES

- A. Infrared Array: Provide door reopening device with uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more light beams shall cause doors to stop and reopen.
- B. Nudging Feature: After car doors are prevented from closing for predetermined adjustable time, through activating door reopening device, a loud buzzer shall sound and doors shall begin to close at reduced kinetic energy.

2.7 CAR ENCLOSURES

- A. General: Provide steel-framed car enclosures with non-removable wall panels, with car roof, access doors, power door operators, and ventilation.
 - 1. Provide standard railings complying with ASME A17.1/CSA B44 on car tops where required by ASME A17.1/CSA B44.
- B. Materials and Finishes: Manufacturer's standards, but not less than the following:
 - 1. Subfloor: Exterior, underlayment grade plywood, not less than 5/8-inch nominal thickness.
 - 2. Floor Finish: Resilient luxury vinyl tile. Floor finish will be by others.
 - 3. Stainless-Steel Wall Panels: Flush, formed-metal construction; fabricated from stainless-steel sheet.
 - a. **[FOR STAINLESS STEEL WALL PANELS]**
 - 4. Plastic-Laminate Wall Panels: Plastic laminate adhesively applied to manufacturer's standard fire-retardant-plastic-laminate panel backing and manufacturer's standard protective edge trim. Panels have a flame-spread index of 75 or less, when tested according to ASTM E 84. Plastic-laminate color, texture, and pattern as selected by Architect from elevator manufacturer's full range.
 - a. **[FOR PLASTIC LAMINATE WALL PANELS] [BOD for PARK HILL]**
 - 5. Fabricate car with recesses and cutouts for signal equipment.
 - 6. Fabricate car door frame integrally with front wall of car.
 - 7. Stainless-Steel Doors: Flush, hollow-metal construction; fabricated from stainless-steel sheet.
 - 8. Sight Guards: Provide sight guards on car doors.
 - 9. Sills: Extruded or machined metal, with grooved surface, 1/4 inch thick.
 - 10. Luminous Ceiling: Suspended, stainless steel with LED fixtures and frame.
 - 11. Handrails: Manufacturer's standard handrails, of shape, metal, and finish indicated.

2.8 HOISTWAY ENTRANCES

- A. Hoistway Entrance Assemblies: Manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Frame size and profile shall accommodate hoistway wall construction.
 - 1. Provide oversized hoistway brackets to span the difference.
 - a. **[[WHEN EXISTING CONDITIONS REQUIRE]]**
- B. Fire-Rated Hoistway Entrance Assemblies: Door and frame assemblies shall comply with NFPA 80 and be listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction based on testing at as close-to-neutral pressure as possible according to NFPA 252 or UL 10B.
 - 1. Fire-Protection Rating: 1 hour with 30-minute temperature rise of 450 deg F.
- C. Materials and Fabrication: Manufacturer's standards, but not less than the following:
 - 1. Frames: Stainless-Steel Frames formed from stainless-steel sheet.
 - a. **[[PAINTED STEEL CAN BE \$700 LESS PER OPENING]]**
 - 2. Frames: Enameled or powder-coated steel.
 - a. **[[PARK HILL BOD]]**
 - 3. Doors and Transoms: Provide Stainless-Steel Doors and Transoms; Flush, hollow-metal construction; fabricated from stainless-steel sheet.

- a. **[[PAINTED STEEL CAN BE \$700 LESS PER OPENING]]**
- 4. Doors and Transoms: Enameled or powder-coated steel.
 - a. **[[PARK HILL BOD]]**
- 5. Star of Life Symbol: Identify emergency elevators with star of life symbol, not less than 3 inches high, on both inside surfaces of hoistway door frames.
- 6. Sight Guards: Provide sight guards on doors matching door edges.
- 7. Sills: Extruded or machined metal, with grooved surface, 1/4 inch thick.
- 8. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M.

2.9 SIGNAL EQUIPMENT

- A. General: Provide hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements with long-life lamps and acrylic or other permanent, non-yellowing translucent plastic diffusers or LEDs.
 - 1. Signal equipment shall be vandal resistant type.
 - a. **[[BoD IS VANDAL RESISTANT - CONFIRM WITH ARCHITECT]]**
 - 2. Call button station to include integrated "In Case of Fire" signage,. Signage shall be code compliant and include required pictogram and text.
 - a. Signs on levels with direct access to an exit to read: "IN CASE OF FIRE, ELEVATORS ARE OUT OF SERVICE USE EXIT."
 - b. All other levels to read: "IN CASE OF FIRE, ELEVATORS ARE OUT OF SERVICE USE EXIT STAIRS."
- B. Car-Control Stations: Provide manufacturer's standard semi-recessed car-control stations. Mount in return panel adjacent to car door unless otherwise indicated.
 - 1. Mark buttons and switches for required use or function. Use both tactile symbols and Braille.
 - 2. Provide "No Smoking" sign matching car-control station, either integral with car-control station or mounted adjacent to it, with text and graphics as required by authorities having jurisdiction.
- C. Emergency Communication System: Two-way voice communication system, with visible signal, which dials preprogrammed number of monitoring station and does not require handset use. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.
- D. **[[FOR 2018 - CONFIRM WITH JURISDICTION]]** Emergency Communication System: Two-way communication system, with visual and text-based and video-based live interactive signal monitored 24 hours a day, 7 days a week. System is fully accessible by the deaf, hard of hearing, and speech impaired, and shall include voice-only options for hearing individuals. The Communication System shall have the ability to communicate with emergency personnel utilizing existing video conferencing technology, chat/text software or other approved technology. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.
- E. Firefighters' Two-Way Telephone Communication Service: Provide flush-mounted cabinet in each car and required conductors in traveling cable for firefighters' two-way telephone communication service specified in Division 28.
- F. Car Position Indicator: Provide illuminated, digital-type car position indicator, located above car door or above car-control station. Also, provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served. Include travel direction arrows if not provided in car-control station.
- G. Hall Push-Button Stations: Provide one hall push-button station at each landing.
 - 1. Provide manufacturer's standard vandal resistant wall-mounted units with flat faceplate for mounting with body of unit recessed in wall.
 - 2. Equip units with buttons for calling elevator [and for indicating desired direction of travel].
- H. Hall Lanterns: Units with digital-display-type arrows; but provide single arrow at terminal landings. Provide the following:
 - 1. Units mounted in both jambs of entrance frame.
- I. Hall Annunciator: With each hall lantern, provide audible signals indicating car arrival and direction of travel. Signals sound once for up and twice for down.
 - 1. At manufacturer's option, audible signals may be placed on cars.

- J. Hall Position Indicators: Provide digital-display-type position indicators, located above hoistway entrance at ground floor. Provide units with flat faceplate and with body of unit recessed in wall.
- K. Emergency Pictorial Signs: Fabricate from materials matching hall push-button stations, with text and graphics as required by authorities having jurisdiction, indicating that in case of fire elevators are out of service and exits should be used instead. Provide one sign at each hall push-button station unless otherwise indicated.

2.10 FINISH MATERIALS

- A. General: Provide the following materials for exposed parts of elevator car enclosures, car doors, hoistway entrance doors and frames, and signal equipment as indicated.
- B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, commercial steel, Type B, exposed, matte finish.
- C. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, commercial steel, Type B, pickled.
- D. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
- E. Stainless-Steel Bars: ASTM A 276, Type 304.
- F. Stainless-Steel Tubing: ASTM A 554, Grade MT 304.
- G. Aluminum Extrusions: ASTM B 221, Alloy 6063.
- H. Nickel Silver Extrusions: ASTM B 151/B 151M, Alloy UNS No. C74500 or UNS No. C77600.
- I. Plastic Laminate: High-pressure type complying with NEMA LD 3, Type HGS for flat applications and Type BKV for panel backing.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work. Examine hoistways, hoistway openings, and pits as constructed; verify critical dimensions; and examine supporting structure and other conditions under which elevator work is to be installed.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions.
- B. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS workmanship and welding operator qualification standards.
- C. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts to minimize vibration transmission to structure and structure-borne noise due to elevator system.
- D. Install piping above the floor, where possible. Install underground piping in casing, where applicable.
- E. Lubricate operating parts of systems as recommended by manufacturers.
- F. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Where possible, delay installation of sills and frames until car is operable in

shaft. Reduce clearances to minimum, safe, workable dimension at each landing.

- G. Leveling Tolerance: 1/8 inch, up or down, regardless of load and travel direction.
- H. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.
- I. Locate hall signal equipment for elevators as follows, unless otherwise indicated:
 - 1. Mount hall lanterns at a minimum of 72 inches above finished floor.
 - 2. Locate hall push-button stations at location most convenient for approaching passengers. Verify location with Architect.

3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of elevator installation and before permitting elevator use (either temporary or permanent), perform acceptance tests as required and recommended by ASME A17.1/CSA B44 and by governing regulations and agencies.
- B. Operating Test: Load elevator to rated capacity and operate continuously for 30 minutes over full travel distance, stopping at each level and proceeding immediately to the next. Record temperature rise of elevator machine during 30-minute test period. Record failure to perform as required.
- C. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times that tests are to be performed on elevators.

3.4 PROTECTION

- A. Temporary Use: Comply with the following requirements for elevator used for construction purposes:
 - 1. Provide car with temporary enclosure, either within finished car or in place of finished car, to protect finishes from damage.
 - 2. Provide strippable protective film on entrance and car doors and frames.
 - 3. Provide padded wood bumpers on entrance door frames covering jambs and frame faces.
 - 4. Provide other protective coverings, barriers, devices, signs, and procedures as needed to protect elevator and elevator equipment.
 - 5. Do not load elevators beyond their rated weight capacity.
 - 6. Engage elevator Installer to provide full maintenance service. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleanup, and adjustment as necessary for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.
 - 7. Engage elevator Installer to restore damaged work, if any, so no evidence remains of correction. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to operate elevator(s).
- B. Check operation of elevator with Owner's personnel present before date of Substantial Completion and again not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

3.6 MAINTENANCE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include twelve (12) months' full maintenance by skilled employees of elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
 - 1. Perform maintenance during normal working hours.

2. Include 24-hour-per-day, 7-day-per-week emergency callback service with response time of two (2) hours or less.

END OF SECTION 142400

SECTION 144200 - WHEELCHAIR LIFTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Inclined platform lifts (144200.A01).

1.2 DEFINITIONS

- A. Definitions in ASME A18.1 apply to Work of this Section.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components, and finishes for lifts.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, safety features, controls, finishes, and accessories.
- B. Shop Drawings: For each lift.
 - 1. Include plans, elevations, sections, details, attachments to other work, and required clearances.
 - 2. Indicate dimensions, weights, loads, and points of load to building structure.
 - 3. Include details of equipment assemblies, method of field assembly, components, and location and size of each field connection.
 - 4. Include diagrams for power, signal, and control wiring.
- C. Samples for Initial Selection: For surfaces and components with factory-applied color finishes.
 - 1. Include Samples of integrally colored materials and accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of sizes indicated below:
 - 1. Metal Finish: Manufacturer's standard-size unit, not less than 3 inches square.
 - 2. Tubular Products and Running Trim: Manufacturer's standard-size unit, 6 inches long.
 - 3. Hardware: Manufacturer's standard, exposed, door-operating device.
 - 4. Fiberglass Finish: Manufacturer's standard-size unit, not less than 3 inches square.
 - 5. Glass and Glazing: Units 12 inches square.
- E. Delegated-Design Submittal: For vertical lift support structure, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data:
 - 1. For manufacturer and Installer.
 - 2. For professional engineer.
- B. Product Certificates: For each type of lift.
 - 1. Include statement that runway, ramp or pit, dimensions as shown on Drawings, and electrical service as shown and specified are adequate for lift being provided.
- C. Evaluation Reports: For post-installed anchors and power-actuated fasteners, from ICC-ES.
- D. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each type of lift to include in operation and maintenance manuals.
 - 1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
 - a. Parts list with sources indicated.
 - b. Recommended parts inventory list.
- B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted use of lifts.
- C. Continuing Maintenance Proposal: Submit a continuing maintenance proposal from Installer to Owner, in the form of a standard two-year maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
 - 1. Maintenance Proximity: Not more than four hours' normal travel time from Installer's place of business to Project site.

1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of lifts that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Accessibility Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC A117.1.
- B. Regulatory Requirements: Comply with ASME A18.1, "Safety Standard for Platform Lifts and Stairway Chairlifts."
 - 1. All designs, clearances, construction workmanship and installation shall be in accordance with requirements specified and code adopted by the authority having jurisdiction. Wheelchair lift shall be subject to local, city and state approval prior to and following installation.
- C. Additional Requirements:
 - 1. NFPA 70 – National Electrical Code.
 - 2. ASME A17.5 – Elevator and Escalator Electrical Equipment.

2.2 INCLINED PLATFORM LIFT (144200.A01)

- A. Inclined Platform Lift for Straight Stairways:
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide "Stair Lift Model Express II", as manufactured by Garaventa Lift, as distributed by Symmetry Elevating Solutions.
 - a. Comparable products from other manufacturers, meeting specified requirements, will be considered when submitted to and accepted by Architect prior to bidding.
 - 2. System Description: The inclined lift serves one flight of straight stairs, with two landings and two stops. Lift consists of an extruded aluminum guide rail, a folding platform that is moved along the guide rail by an integrated rack and pinion drive system, overspeed safety system and call stations at each landing. Conform to the following design requirements:
 - 3. Application: Indoor.
 - 4. Number of Stops: 2 Stops.
 - a. Entry and Exit shall be straight through (180 degree) as indicated on Drawings.

5. Platform:
 - a. Platform surface shall be "non-skid" design, slip resistant. Provide manufacturer's standard, steel floor plate with checkered texture.
 - b. Platform Size A (ADA Compliant): 800 mm (31 1/2 in.) wide by 1250mm (49 1/4") long.
 - c. Platform Operation:
 - 1) Automatic Fold: Folded and unfolded electrically from the call station.
 - d. Under Platform Obstruction Sensing:
 - 1) Provide an under-platform sensing device to stop the platform from traveling in the downward direction when encountering 20N (4 lbf) of pressure.
 - 2) Platform is permitted to travel in the opposite direction of the obstruction to allow clearing.
6. Travel Speed: 4m/min (13 fpm) traveling up; 5 m/min (16 fpm) traveling down.
7. Platform Load Rating: 250 kg (550 lbs).
8. Power Supply: 208-240 VAC, single phase, 50/60 Hz. on a dedicated 20-amp circuit. Power Transmission: Worm gear reduction to a pinion moving on a fixed gear rack.
 - a. A frequency inverter shall be used to smoothly start and stop the platform motion.
 - b. Drive carriage and associated control devices to be located within the platform conveyance.
 - c. An upper final limit switch shall be provided to stop the lift in the event of a failure of the primary limit switch
9. Motor: Not less than 0.6 kW (3/4 HP) electric motor with an integrated brake, one phase.
10. On-Board Main Controller: Provide manufacturer's standard stainless steel control station; consisting of and up/down directional control and an illuminated emergency stop switch equipped with an audible alarm.
11. Landing Controllers: Provide manufacturer's standard stainless steel control stations equipped with constant-pressure (Rocker Style), call only device at each landing.
12. Emergency Operation: Provide manual operation to raise or lower unit in case of malfunction or power loss.
13. Emergency Battery Operation:
 - a. Auxiliary Power: Provide an external battery back-up system for normal up/down lift operation during a power failure for a minimum period of one hour with rated load.
 - b. Emergency battery lowering provide an on-board battery system to allow the user to lower the platform during a power failure.
14. Pedestrian Handrail Integrated with Guide Rail:
 - a. Provide a pedestrian handrail to be mounted to the top of the upper rail.
 - b. The top of the handrail gripping surface shall be between 785 mm (31 in.) and 1270 mm (50 in.) above the stair nosing and have a smooth gripping surface 38 mm (1-1/2 in.) in diameter.
 - c. Handrail will be on the same plane as the upper rail of the lift.
- B. Accessories: Provide units with the following accessories:
 1. Provide manufacturer's standard grab rail for platform.
 2. Provide platform kick plate, hand grips, and boarding ramps.
 3. Fold down seat with seat belt.
 4. Vandal resistant platform lock (electric).
 5. Platform folds automatically if left unattended at landing to keep stairways clear.

2.3 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Tubing: ASTM A 500/A 500M.
- C. Steel Pipe: ASTM A 53/A 53M; standard weight (Schedule 40) unless otherwise indicated or required by loads.
- D. Steel Sheet: ASTM A 1008/A 1008M, cold-rolled commercial steel (CS) or ASTM A 1011/A 1011M hot-rolled, commercial steel (CS); as required for each use.
- E. Galvanized-Steel Sheet: ASTM A 653/A 653M, G90 zinc coating,
- F. Galvanizing: Hot-dip galvanize items complying with the following:
 1. ASTM A 123/A 123M, for galvanizing steel and iron products.
 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- G. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use, corrosion resistance, and finish indicated; manufacturer's standard strengths and thicknesses for type of use.
 1. Extruded Aluminum: ASTM B 221.

- 2. Aluminum Sheet and Plate: ASTM B 209.
- H. Stainless-Steel Bars and Shapes: ASTM A 276/A 276M, Type 304.
- I. Stainless-Steel Tubing: ASTM A 554, Grade MT-304.
- J. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, Type 304.
- K. Stainless-Steel Floor Plate: ASTM A 793.
- L. Acrylic Glazing: ASTM D 4802, Category A-1 (cell-cast) or Category A-2 (continuous cast), Finish 1 (smooth or polished), clear or tinted as indicated. Products shall be UV stabilized and recommended in writing by manufacturer for exterior use.
- M. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing structural members, guide rails, machines, and other lift components where installation of devices is specified in another Section.
- N. Expansion Anchors: Anchor-bolt-and-sleeve assembly of material indicated below with capability to sustain a load equal to 10 times the load imposed as determined by testing according to ASTM E 488 conducted by a qualified independent testing agency.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
- O. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M.
 - 1. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.4 FASTENERS

- A. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC193, ICC-ES AC58, or ICC-ES AC308 as appropriate for the substrate and manufacturer's design.
 - 1. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) or Alloy Group 2 (A4) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).
- B. Power-Actuated Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

2.5 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- 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.

2.6 FINISHES

- A. Steel Factory Finish:
 - 1. Powder-Coat Finish: After cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat to a minimum dry film thickness of 2 mils.
 - 2. Color and Gloss: As selected by Architect from manufacturer's full range.
- B. Stainless-Steel Finishes:
 - 1. Plate Finish: As selected by Architect from manufacturer's full range.
 - 2. Grab Rail Finish: As selected by Architect from manufacturer's full range.
- C. Aluminum Finishes:
 - 1. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

2. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - a. Color and Gloss: As selected by Architect from manufacturer's full range.

D. UV Stabilized Acrylic Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, critical dimensions, and other conditions affecting performance of the Work.
- B. Minimum Headroom Clearance: Verify that installed lift will have a minimum headroom of 79 inches at any point during travel.
- C. Additional Examination Requirements:
 1. Verify correct space requirements and substrate preparation requirements in accordance with approved manufacturer's drawings.
 2. Verify electrical service is of correct type and at correct location.
- D. Prepare written report, endorsed by Installer, listing conditions detrimental to performance.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with ASME A18.1 and manufacturer's written instructions for installation of lifts unless otherwise indicated.
- B. Additional Installation Requirements:
 1. Lift shall be installed in accordance with architect's approved plans and specifications, manufacturer's instructions, and all applicable regulatory requirements.
- C. Installation space and substrate shall be of sufficient strength to support the loads imposed on it during operation of the lift. Refer to structural loading diagrams provided by manufacturer to ensure proper provision is made.
- D. Secure lifts to building construction as follows unless otherwise indicated:
 1. For concrete and solid masonry anchorage, use post-installed anchors.
 2. For hollow masonry anchorage, use toggle bolts.
 3. For wood stud partitions, use hanger or lag bolts set into studs or wood backing between studs. Coordinate with carpentry work to locate backing members.
 4. For steel-framed partitions, use self-tapping screws fastened to steel framing or to concealed steel reinforcements.
- E. Wiring Method: Conceal conductors and cables within housings of units or building construction. Do not install conduit exposed to view in finished spaces. Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
- F. Coordinate runway doors with platform travel and positioning, for accurate alignment and minimum clearance between platforms, runway doors, sills, and door frames.
- G. Position sills accurately and fill space under sills solidly with nonshrink, nonmetallic grout.
 1. Leveling Tolerance: 1/4 inch up or down, regardless of load and direction of travel.
- H. Coordinate platform doors with platform travel and positioning.
- I. Adjust stops for accurate stopping and leveling at each landing, within required tolerances.
 1. Leveling Tolerance: 1/4 inch up or down, regardless of load and direction of travel.

- J. Adjust retractable ramps to meet maximum allowable slope and change-in-elevation requirements, and to lie fully against landing surfaces.
- K. Lubricate operating parts of lift, including drive mechanism, guide rails, hinges, safety devices, and hardware.
- L. Test safety devices and verify smoothness of required protective enclosures and other surfaces.

3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of lift installation and before permitting use of lifts, perform acceptance tests as required and recommended by ASME A18.1 and authorities having jurisdiction.
- B. Operating Test: In addition to acceptance testing, load lifts to rated capacity and operate continuously for 30 minutes between lowest and highest landings served. Readjust stops, signal equipment, and other devices for accurate stopping and operation of system.
- C. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times tests are to be performed on lifts.

3.4 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of lift Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper lift operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lifts. Include a review of emergency systems and emergency procedures to be followed at time of operational failure and other building emergencies.
- B. Check operation of lifts with Owner's personnel present and before date of Substantial Completion. Determine that operating systems and devices are functioning properly.
- C. Check operation of lifts with Owner's personnel present not more than one month before end of warranty period. Determine that operating systems and devices are functioning properly.

END OF SECTION 144200