OCEANCREST HEALTH AND REHABILITATION CENTER

170-BED NURSING HOME AND MEMORY CARE FACILITY

MINTON ROAD AT HERITAGE OAKS BLVD., WEST MELBOURNE, FLORIDA

PROJECT MANUAL VOL I

APRIL 2025

ACI Job #1966

(DIVISIONS 010000 TO 149999)

ARCHITECTURAL CONCEPTS INC
Architecture, Planning, Interior Design & Development Management
architecturalconceptsweb.com AA0001251 / EB0005890

2401 WEST BAY DRIVE, SUITE 503, LARGO, FL 33770

Table of Contents

Division	Section Title

VOLUME I

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

00 0101 PROJECT TITLE PAGE
00 0107 SEALS PAGE
00 0115 LIST OF DRAWING SHEETS
00 2600 PROCUREMENT SUBSTITUTION PROCEDURES
00 3132 GEOTECHNICAL DATA
00 4321 ALLOWANCE FORM
00 4323 ALTERNATES FORM
00 6000 PROJECT FORMS

DIVISION 01 - GENERAL REQUIREMENTS

01 2500 SUBSTITUTION PROCEDURES
01 2600 CONTRACT MODIFICATION PROCEDURES
01 2900 PAYMENT PROCEDURES
01 3100 PROJECT MANAGEMENT AND COORDINATION
01 3200 CONSTRUCTION PROGRESS DOCUMENTATION
01 3233 PHOTOGRAPHIC DOCUMENTATION
01 3300 SUBMITTAL PROCEDURES
01 4000 QUALITY REQUIREMENTS
01 5000 TEMPORARY FACILITIES AND CONTROLS
01 5800 PROJECT IDENTIFICATION & SIGN
01 6000 PRODUCT REQUIREMENTS
01 7300 EXECUTION
01 7700 CLOSEOUT PROCEDURES
01 7823 OPERATION AND MAINTENANCE DATA
01 7839 PROJECT RECORD DOCUMENTS
01 7900 DEMONSTRATION AND TRAINING

DIVISION 03 - CONCRETE

03 1100 CONCRETE FORMING
03 2000 CONCRETE REINFORCING
03 2900 UNDER SLAB VAPOR BARRIER-RETARDER
03 3000 CAST-IN-PLACE CONCRETE

DIVISION 04 - MASONRY

04 0513 MASONRY MORTARING
04 0516 MASONRY GROUTING
04 0523 MASONRY ACCESSORIES

04 2200 CONCRETE UNIT MASONRY
04 4313.16 ADHERED STONE MASONRY VENEER

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES
06 1000 ROUGH CARPENTRY
06 1753 SHOP FABRICATED WOOD TRUSSES
06 2000 FINISH CARPENTRY
06 2023 INTERIOR FINISH CARPENTRY
06 4116 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS
06 6400 PLASTIC PANELING
06 6620 MANUFACTURED TRIM & ORNAMENTS- URETHANE

DIVISION 07 - THERMAL AND MOISTURE PROTECTION
07 2100 THERMAL INSULATION
07 2413 POLYMER-BASED EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)
07 2500 WEATHER BARRIERS
07 2600 VAPOR RETARDERS
07 2726 FLUID-APPLIED MEMBRANE AIR BARRIERS
07 3113 ASPHALT SHINGLES
07 4113.16 STANDING-SEAM METAL ROOF PANELS
07 4646 FIBER-CEMENT SIDING
07 5423 THERMOPLASTIC POLYOLEFIN (TPO) ROOFING
07 6200 SHEET METAL FLASHING AND TRIM
07 6200 SHEET METAL FLASHING AND TRIM
07 7100 ROOF SPECIALTIES
07 7129 MANUFACTURED ROOF EXPANSION JOINTS
07 7200 ROOF ACCESSORIES
07 8413 PENETRATION FIRESTOPPING
07 8443 JOINT FIRESTOPPING
07 9200 JOINT SEALANTS
07 9513.13 INTERIOR EXPANSION JOINT COVER ASSEMBLIES
07 9513.16 EXTERIOR EXPANSION JOINT COVER ASSEMBLIES

DIVISION 08 - OPENINGS
08 1113 HOLLOW METAL DOORS AND FRAMES
08 1416 FLUSH WOOD DOORS
08 3113 ACCESS DOORS AND FRAMES
08 4113 ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS
08 4229.23 SLIDING AUTOMATIC ENTRANCES
08 5313 VINYL WINDOWS
08 7111 DOOR HARDWARE (DESCRIPTIVE SPECIFICATION)
08 7113 AUTOMATIC DOOR OPERATORS
08 8000 GLAZING
08 8300 MIRRORS

08 8813 FIRE-RESISTANT GLAZING
08 9119 FIXED LOUVERS

DIVISION 09 - FINISHES
09 2216 NON-STRUCTURAL METAL FRAMING
09 2400 CEMENT PLASTERING
09 2900 GYPSUM BOARD
09 3000 TILE
09 5123 ACOUSTICAL TILE CEILINGS
09 6513 RESILIENT BASE AND ACCESSORIES
09 6723 RESINOUS FLOORING
09 6813 TILE CARPETING
09 9113 EXTERIOR PAINTING
09 9123 INTERIOR PAINTING

DIVISION 10 - SPECIALTIES
10 1400 SIGNAGE
10 2123 CUBICLE CURTAINS AND TRACK
10 2600 WALL AND DOOR PROTECTION
10 2800 TOILET, BATH, AND LAUNDRY ACCESSORIES
10 4413 FIRE PROTECTION CABINETS
10 4416 FIRE EXTINGUISHERS
10 5113 METAL LOCKERS

DIVISION 11 - EQUIPMENT
11 3100 APPIANCES
11 4000 KITCHEN EQUIPMENT

DIVISION 12 - FURNISHINGS
12 2114 WINDOW BLINDS
12 3623.13 PLASTIC-LAMINATE-CLAD COUNTERTOPS
12 3661.19 QUARTZ AGGLOMERATE COUNTERTOPS

VOLUME II

00 0107 SEALS PAGE

DIVISION 21 - FIRE SUPPRESSION
21 0517 SLEEVES AND SLEEVE SEALS FOR FIRE-SUPPRESSION PIPING
21 0518 ESCUTCHEONS FOR FIRE-SUPPRESSION PIPING
21 0553 IDENTIFICATION FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT
21 1119 FIRE-DEPARTMENT CONNECTIONS
21 1313 WET-PIPE SPRINKLER SYSTEMS

DIVISION 22 - PLUMBING
22 0513 COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT

22 0517 SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING
22 0518 ESCUTCHEONS FOR PLUMBING PIPING
22 0519 METERS AND GAGES FOR PLUMBING PIPING
22 0523 GENERAL-DUTY VALVES FOR PLUMBING PIPING
22 0529 HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT
22 0548.13 VIBRATION CONTROLS FOR PLUMBING PIPING AND EQUIPMENT
22 0553 IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT
22 0719 PLUMBING PIPING INSULATION
22 1116 DOMESTIC WATER PIPING
22 1119 DOMESTIC WATER PIPING SPECIALTIES
22 1123 DOMESTIC WATER PUMPS
22 1123.13 DOMESTIC-WATER PACKAGED BOOSTER PUMPS
22 1223 FACILITY INDOOR POTABLE-WATER STORAGE TANKS
22 1316 SANITARY WASTE AND VENT PIPING
22 1319 SANITARY WASTE PIPING SPECIALTIES
22 1323 SANITARY WASTE INTERCEPTORS
22 1413 FACILITY STORM DRAINAGE PIPING
22 1423 STORM DRAINAGE PIPING SPECIALTIES
22 1429 SUMP PUMPS
22 3100 DOMESTIC WATER SOFTENERS
22 3400 FUEL-FIRED, DOMESTIC-WATER HEATERS
22 4100 RESIDENTIAL PLUMBING FIXTURES
22 4216.13 COMMERCIAL LAVATORIES
22 4216.16 COMMERCIAL SINKS
22 4716 PRESSURE WATER COOLERS

DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)
23 0513 COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT
23 0518 ESCUTCHEONS FOR HVAC PIPING
23 0529 HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT
23 0548.13 VIBRATION CONTROLS FOR HVAC
23 0553 IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT
23 0593 TESTING, ADJUSTING, AND BALANCING FOR HVAC
23 0713 DUCT INSULATION
23 0719 HVAC PIPING INSULATION
23 0800 COMMISSIONING OF HVAC
23 0900 CONTROLS
23 1123 FACILITY NATURAL-GAS PIPING
23 0993 SEQUENCE OF OPERATIONS FOR HVAC CONTROLS
23 2300 REFRIGERANT PIPING
23 3113 METAL DUCTS
23 3300 AIR DUCT ACCESSORIES
23 3423 HVAC POWER VENTILATORS
23 3433 AIR CURTAINS

23 3713 DIFFUSERS, REGISTERS, AND GRILLES
23 5100 BREECHINGS, CHIMNEYS, AND STACKS
23 6200 PACKAGED COMPRESSOR AND CONDENSER UNITS
23 7416.11 PACKAGED, SMALL-CAPACITY, ROOFTOP AIR-CONDITIONING UNITS
23 7416.13 PACKAGED, LARGE-CAPACITY, ROOFTOP AIR-CONDITIONING UNITS
23 7433 DEDICATED OUTDOOR-AIR UNITS
23 8113 PACKAGED TERMINAL AIR-CONDITIONERS
23 8126 SPLIT-SYSTEM AIR-CONDITIONERS
23 8129 VARIABLE REFRIGERANT FLOW HVAC SYSTEMS
23 8239.19 WALL AND CEILING UNIT HEATERS

DIVISION 26 - ELECTRICAL
26 0000 BASIC ELECTRICAL GENERAL REQUIREMENTS
26 0519 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
26 0520 TYPE MC CABLE
26 0526 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
26 0533 RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS
26 0923 LIGHTING CONTROL DEVICES
26 0943 NETWORK LIGHTING CONTROLS
26 2413 SWITCHBOARDS
26 2416 PANELBOARDS
26 2726 WIRING DEVICES
26 2813 FUSES
26 2816 ENCLOSED SWITCHES AND CIRCUIT BREAKERS
26 2819 MOTOR AND CIRCUIT DISCONNECTS
26 3213 ELECTRICAL GENERATING SYSTEM
26 3600 TRANSFER SWITCHES
26 4113 LIGHTNING PROTECTION SYSTEM
26 4313 SURGE PROTECTION FOR LOW-VOLTAGE ELECTRICAL POWER
26 5100 LIGHTING FIXTURES AND LAMPS
26 5200 EMERGENCY LIGHTING

DIVISION 27 - COMMUNICATIONS
27 10-00 – STRUCTURED CABLING
27 1500 COMMUNICATIONS HORIZONTAL CABLING

DIVISION 28 - ELECTRONIC SAFETY AND SECURITY
28 10-00 – ACCESS CONTROL SYSTEM
28 3100 DIGITAL, ADDRESSABLE FIRE ALARM SYSTEM
28 5234 PUBLIC SAFETY EMERGENCY COMMUNICATION SYSTEM

DIVISION 31 - EARTHWORK
31 1000 SITE CLEARING
31 2000 EARTH MOVING

31 3116 TERMITE CONTROL

DIVISION 32 - EXTERIOR IMPROVEMENTS
32 3119 DECORATIVE METAL FENCES AND GATES
32 8400 PLANTING IRRIGATION

APPENDIX
A FOOD SERVICE CUT SHEETS

END OF TABLE OF CONTENTS

SECTION 000101

PROJECT TITLE PAGE

1.1 PROJECT MANUAL: CONSTRUCTION DOCUMENTS SET

A. Aston Health: Oceancrest Health and Rehabilitation Center

B. Aston Health

C. West Melbourne, Florida 32904

D. Architect Project No. 1966

E. Architectural Concepts, Inc.

F. 2401 West Bay Drive, Suite 503, Largo, Florida 33770

G. Phone: 727-584-7178

H. Fax: 727-584-4319

I. Website: www.archconcept.com

J. Issued: 04 - 2025

END OF DOCUMENT 000101

DOCUMENT 000107 - SEALS PAGE

1.1 DESIGN PROFESSIONALS OF RECORD

A. Architect:

1. Kenneth L. Tobin.
2. AR0012633.
3. Responsible for Divisions 01-49 Sections except where indicated as prepared by other design professionals of record.

Kenneth L Tobin

Digitally signed by Kenneth L Tobin
DN: CN=Kenneth L Tobin, dnQualifier=A01410C00000195D800BED500076909, O=ARCHITECTURAL CONCEPTS INC, C=US
Date: 2025.05.19 11:19:51-04'00'



B. Structural Engineer:

1. Bora Erbilen.
2. PE55996.
3. Responsible for 031100, 032000, 033000, 040513, 040516, 040523, 042200, 061753.

Bora Erbilen
2025.05.19
08:06:27-04'00'



END OF DOCUMENT 000107

DOCUMENT 000115 - LIST OF DRAWING SHEETS

1.1 LIST OF DRAWINGS

A. Drawings: Drawings consist of the Contract Drawings and other drawings listed on the Cover page of the separately bound drawing set titled Oceancrest Health and Rehabilitation Center, dated 4/2025, as modified by subsequent Addenda and Contract modifications.

END OF DOCUMENT 000115

DOCUMENT 002600 - PROCUREMENT SUBSTITUTION PROCEDURES

1.1 DEFINITIONS

A. Procurement Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Procurement and Contracting Documents, submitted prior to receipt of bids.

B. Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Contract Documents, submitted following Contract award. See Section 012500 "Substitution Procedures" for conditions under which Substitution requests will be considered following Contract award.

1.2 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.

1.3 PROCUREMENT SUBSTITUTIONS

A. Procurement Substitutions, General: By submitting a bid, the Bidder represents that its bid is based on materials and equipment described in the Procurement and Contracting Documents, including Addenda. Bidders are encouraged to request approval of qualifying substitute materials and equipment when the Specifications Sections list materials and equipment by product or manufacturer name.

B. Procurement Substitution Requests will be received and considered by Owner when the following conditions are satisfied, as determined by Architect; otherwise requests will be returned without action:

1. Extensive revisions to the Contract Documents are not required.
2. Proposed changes are in keeping with the general intent of the Contract Documents, including the level of quality of the Work represented by the requirements therein.
3. The request is fully documented and properly submitted.

1.4 SUBMITTALS

A. Procurement Substitution Request: Submit to Architect. Procurement Substitution Request must be made in writing by prime contract Bidder only in compliance with the following requirements:

1. Requests for substitution of materials and equipment will be considered if received no later than 10 days prior to date of bid opening.
2. Submittal Format: Submit Procurement Substitution Request, using format provided on Project Web site.

a. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specifications Sections and drawing numbers.
b. Provide complete documentation on both the product specified and the proposed substitute, including the following information as appropriate:

1) Point-by-point comparison of specified and proposed substitute product data, fabrication drawings, and installation procedures.
2) Copies of current, independent third-party test data of salient product or system characteristics.
3) Samples where applicable or when requested by Architect.
4) Detailed comparison of significant qualities of the proposed substitute with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
5) Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
6) Research reports, where applicable, evidencing compliance with building code in effect for Project, from ICC-ES, FBC, NFPA & Healthcare Guidelines.
7) Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, which will become necessary to accommodate the proposed substitute.

c. Provide certification by manufacturer that the substitute proposed is equal to or superior to that required by the Procurement and Contracting Documents, and that its in-place performance will be equal to or superior to the product or equipment specified in the application indicated.
d. Bidder, in submitting the Procurement Substitution Request, waives the right to additional payment or an extension of Contract Time because of the failure of the substitute to perform as represented in the Procurement Substitution Request.

B. Architect's Action:

1. Architect may request additional information or documentation necessary for evaluation of the Procurement Substitution Request. Architect will notify all bidders of acceptance of the proposed substitute by means of an Addendum to the Procurement and Contracting Documents.

C. Architect's approval of a substitute during bidding does not relieve Contractor of the responsibility to submit required shop drawings and to comply with all other requirements of the Contract Documents.

END OF DOCUMENT 002600

DOCUMENT 003132 - GEOTECHNICAL DATA

1.1 GEOTECHNICAL DATA

A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information. This Document and its attachments are not part of the Contract Documents.

B. Because subsurface conditions indicated by the soil borings are a sampling in relation to the entire construction area, and for other reasons, the Owner, the Architect, the Architect's consultants, and the firm reporting the subsurface conditions do not warranty the conditions below the depths of the borings or that the strata logged from the borings are necessarily typical of the entire site. Any party using the information described in the soil borings and geotechnical report shall accept full responsibility for its use.

C. Soil-boring data for Project, obtained by KSM Engineering and Testing, dated September 27-28, 2024, is available for viewing as appended to this Document.

D. A geotechnical investigation report for Project, prepared by KSM Engineering and Testing, dated October 8, 2024, is available for viewing as appended to this Document.

1. The opinions expressed in this report are those of a geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by a geotechnical engineer. Owner is not responsible for interpretations or conclusions drawn from the data.
2. Any party using information described in the geotechnical report shall make additional test borings and conduct other exploratory operations that may be required to determine the character of subsurface materials that may be encountered.

END OF DOCUMENT 003132

KSM ENGINEERING AND TESTING

Architectural Concepts, Inc.
Kenneth L. Tobin, AIA.
2401 West Bay Drive, Suite 503
Largo, FL. 33770

October 8, 2024

Re: Azalea Skilled Nursing & Memory Care Facility
Minton Road & Heritage Oaks Blvd
West Melbourne, Florida
KSM Project #: 2408005-b

Dear Mr. Tobin:

As requested, KSM Engineering & Testing has performed a subsurface investigation at the above referenced site. Presentation of the data gathered during the investigation is included in this report.

Scope of Work and Professional Service Agreement:

The scope of work and the agreement to perform a geotechnical exploration is contingent upon KSM's September 20, 2024, revised proposal to Architectural Concepts, Inc., in care of Mr. Kenneth Tobin, AIA. The agreement was signed by Mr. Tobin on September 20, 2024, and was returned to KSM thereafter.

Site Description:

Location & Physiography – The project site was located in West Melbourne, Florida, immediately northeast of the intersection of Heritage Oaks Blvd and Minton Rd. At the time of drilling, the site was found to be relatively flat. Vegetation on the site predominantly consisted of light ground cover (grass).

Project Description:

The following information is based, in part, on conversations with the client, our assumptions with respect to the site and the project, and on our review of the provided plans entitled "Architectural Site Plan", by Architectural Concepts Inc. If this document has been superseded, or if any changes have been made to this plan sheet, please contact KSM to submit the current plan sheets, so we can make any adjustments and revise this report, if and as necessary. Brief summaries of the developmental features shown on the plans are described below.

Structure – Based on conversations with the client, it is our understanding that a single-story memory care facility is planned to be constructed on the site. KSM assumes that the anticipated loading conditions will be less than 3.0 kips per linear foot along load bearing walls and that the maximum column loads will be less than 50 kips per column.

Grading – The provided documents did not include existing or proposed grading plan information. For purposes of this evaluation, KSM has assumed that the rough graded building pad elevations may lie up to approximately 2 to 3 feet above the existing land surface.

Pavements – The site development will include the installation of pavement to provide vehicle parking, driving, and connection pathways into and around the property.

At the time of this report, KSM has not been furnished with a grading plan, foundation plan, or foundation settlement tolerances. Once finalized, this information should be provided to KSM so that we may review and provide recommendations and opinions as necessary.

The scope of our study consisted of the following:

1. Reviewed the publicly available USDA Soil Survey information for the site.
2. Performed soil borings within the approximate limits of construction.
3. Measured the encountered groundwater level at each boring.
4. Reviewed the soil samples and field soil boring logs in our laboratory and assignment of analytical laboratory testing to selected samples.
5. Performed the assigned analytical laboratory tests on the selected soil samples.
6. Evaluated the discovered subsurface conditions with respect to the proposed project and prepared recommendations delineating earthwork procedures and foundation design.
7. Prepared this report to document our findings.

NCRS Surficial Soil Information:

Our review of the USDA, Natural Resources Conservation Service (NCRS) indicates that the following USDA soil mapping unit was identified.

19: Rivera fine sand, 0 to 2 percent slopes – The typical profile of this soil reportedly consists of deposits of sand in the upper 28 inches, underlain by deposits of sandy clay loam to a depth of 42 inches below grade, and deposits of fine sand and shell fragments from 42 to 62 inches below grade. The water table is within 10 inches of the surface for 2 to 4 months in most years and 10 to 30 inches deep most of the rest of the year. It is below 40 inches for short periods in driest seasons. Some areas are flooded for periods ranging from a few days to about 3 months. Depressions are ponded for periods ranging from 6 to 12 months.

Site Investigation:

Subsurface Testing – KSM's site investigation program consisted of performing the following tests:

- Twelve (12) Standard Penetration Test (SPT) borings, terminated at approximate depths ranging from 10 to 20 feet below the existing ground surface, were performed within the limits of the proposed structure.

- Four (4) Hand Auger (HA) borings which were terminated at an approximate depth of 6 feet below the existing ground surface. The borings were performed in the location of the proposed paved areas. Static cone penetrometer (SCP) soundings were performed in conjunction with each aforementioned HA borings.

SPT Borings – The SPT boring profiles contain "N" values. These "N" values represent the number of hammer blows required to advance the split spoon sampler 12 inches. The "N" values have been empirically correlated with various soil properties and are indicative of the relative density of the soils. The "N" values were obtained by means of both automatic and safety hammers.

The following tables presents relative densities of cohesionless/granular soils and their corresponding ranges of SPT and static cone penetrometer data.

SPT "N" Value Interpretation		
Relative Density	**Automatic Hammer**	**Safety Hammer**
Very Loose	0 – 3	0 – 4
Loose	3 – 8	4 – 10
Medium Dense	8 – 24	10 – 30
Dense	24 – 40	30 – 50
Very Dense	>40	>50

Static Cone Penetrometer	
Relative Density	**Static Penetrometer Reading**
Very Loose	<15
Loose	15 – 40
Medium Dense	40 – 70
Dense	>70

Soil Classification – The field soil boring logs and recovered soil samples were transported to KSM's office from the project site. Following the completion of the field exploration activities, visual and tactile examination of the soil samples was performed under the supervision of a geotechnical engineer to identify the engineering classification of the soil samples that were obtained in the field exploration. The visual classification of the samples was performed in general accordance with the current United Soil Classification System (ASTM D 2487).

General Subsurface Soil Classification Summary – The following table outlines the general subsurface conditions encountered during our investigation. Refer to the boring logs and location map for specific information regarding our interpretation of the field boring logs.

Generalized Soil Profile	
Approximate Depth Below Grade (Feet)	**Discovered Subsurface Conditions**
0 to 4	Very loose to medium-dense sand, slightly silty sand, clayey sand, and **sand with organics**
4 to 20	Loose to medium-dense sand, slightly silty, and silty sand

The static cone penetrometer tests performed at the time of our subsurface investigation indicate that the subsurface soils appear to be loose near the surface and medium dense from approximately 3 to 6 feet below existing grade.

Groundwater Table – Following the completion of each soil boring, the groundwater was allowed to attain an equilibrium level, and the approximate depth to the surface of the groundwater was measured from existing ground elevation and recorded in the field log. The typical observed water table was encountered at approximate depths ranging from 1.5 to 2.6 feet below existing grade.

It should be noted that fluctuations of the groundwater table will occur between and away from our boring locations as well as due to seasonal variations in the amount of rainfall, runoff, and other factors not evident at the time the borings were performed. Therefore, groundwater levels during construction or at other times in the future may be higher or lower than the levels indicated on the boring logs.

The records of the soils encountered, the penetration resistances, and groundwater levels are documented on the attached boring logs.

Analytical Laboratory Testing:

Natural Moisture Content – Testing was performed in general accordance with procedures described in ASTM D 2216.

Fines Content – Testing was performed in general accordance with procedures described in ASTM D 1140.

Organic Content Tests – Testing was performed in general accordance with procedures described in ASTM D 2974.

The following tests were performed on the soils listed in the following table:

Analytical Laboratory Testing Results					
Boring	**Sample Depth (ft)**	**Material Description**	**Moisture %**	**Fines %**	**Organic %**
B-1	4-6	Gray Silty Sand	24	19	-
B-2	0-2	Gray Sand with Organics	37	3	6
B-6	0-2	Brown Clayey Sand	36	16	-
B-7	4-6	Gray Slightly Silty Sand	16	11	-
	8-10	Gray Silty Sand	18	13	-
B-11	2-4	Light Gray Sand	16	4	-
B-12	4-6	Light Gray Silty Sand with Some Shell Fragments	14	36	-
HA-1	0-2	Gray Slightly Silty Sand with Traces of Shell Fragments	12	11	-
HA-3	0-4	Gray Sand	17	2	-

"-" Indicates a non-tested parameter

Engineering Evaluation and Conclusions:

Based on the information obtained from this site investigation, we are pleased to offer the following evaluations:

Foundation System Evaluation - In order for a shallow foundation to perform satisfactorily, it must be able to support the structural loads with an acceptable factor of safety against excessive settlements, both total and differential. Based on our review of the boring logs and analytical laboratory testing results we believe that the very loose soils with organics will consolidate under the applied load of the proposed structure. KSM has concluded that a shallow foundation constructed on an unimproved subgrade will experience settlement, both total and differential, that exceed the general accepted safe limits for the structure.

KSM believes that the proposed structure can be supported on a shallow foundation provided the subgrade is improved. We recommend that this is achieved by excavating the near surface weak soils, to a depth of at least 2 feet below existing grade, from within the building pad and backfilling the excavated area with structural fill, compacted in lifts, to the proposed finished building pad subgrade elevation.

The following sections provide recommendations for the site preparation and foundation design.

Site Preparation:

Site Subgrade Preparation – The following earthwork procedure is recommended.

1. Clearing and Grubbing – The proposed construction area, plus a minimum margin of five feet beyond the proposed limits of construction, should be prepared by removing any construction debris and underground utilities (if applicable), and organic materials including roots and surface vegetation. The roots of the trees should be removed in their entirety. Stump grinding as a means of removing the root systems is not recommended.

2. Excavation Operations – Beginning in the location of boring B-2, excavate the deposits or organic soils. KSM anticipates that this will require the excavation of approximately 2 feet of soils, however, it may be more or less. Determining the exact extent vertical and lateral extent of the organic soils was not within the scope of our investigation, therefore we recommend that KSM personnel is on site during the excavation operation to observe the soils being removed.

3. Subgrade Improvement – The areas created in step 1 and 2 above, should be graded level and proofrolled to compact the subgrade. Sufficient passes of the roller should be made to produce a firm and un-yielding working surface. The client should retain KSM to evaluate the prepared surface. In the event that surface compaction is insufficient to densify the exposed subgrade to 2 feet, the exposed excavated subgrade can be further undercut, and the compaction continued to densify the subgrade to the specified depth. Testing should be done to confirm that the specified level of compaction has been achieved. Areas that deflect or yield during proof-rolling operations should be delineated and reviewed by the Geotechnical Engineer or their representative. In addition, excessively wet or dry material should either be removed, remediated, or moisture conditioned and recompacted.

4. Grading – Upon completion of the compaction operation, the exposed surfaces should be filled to produce the desired line and grades of the building pads. Due to the discovered water table elevation at the time of drilling, we recommend fill should consist of sandy soil containing less than 10% material that passing through the U.S. Standard no. 200 sieve and is free of debris and organic material.

   All fill should be placed in level lifts not more than 12-inches of loose thickness, moisture conditioned, and compacted to attain an in-place dry density that equals or exceeds 95 percent of the Modified Proctor (ASTM D-1557) maximum dry density. We recommend performing in field density testing at appropriate times during the backfilling process. Please contact our office to schedule soil density testing. Each lift of compacted fill should be tested, evaluated, and reworked, as necessary, until approved by the KSM Geotechnical Engineer, or their representative, prior to placement of additional lifts.

5. Footing Excavation and Subgrade Compaction – At the footing locations, excavate the compacted subgrade soils to the proposed design elevations. The exposed footing subgrade soils should then be compacted to attain an in-place dry density that equals or exceeds 95 percent of the Modified Proctor (ASTM D 1557) maximum dry density,

to a minimum depth of 1 foot below the bottom of the footing. Testing should be done to confirm that the specified level of compaction has been achieved.

6. Utility, Foundation, Slab on Grade – Upon completion of the previous steps, the foundation forms (if used) and steel reinforcement can be installed, and the foundation concrete should be cast, as necessary. Please refer to the "Floor Slabs" section below for information with regards to the recommended additional steel for the foundation. Any backfill that is placed adjacent to the foundations, as well as backfill placed in utility trench excavations within the building pad, should be likewise compacted to attain or exceed 95 percent of the Modified Proctor (ASTM D 1557) maximum dry density. Testing should be done to confirm that the specified level of compaction has been achieved.

Excavation Stability – Excavations should be sloped as necessary to prevent slope failure and to allow backfilling. As a minimum, temporary excavations below 4-foot depth should be sloped in accordance with OSHA regulations. Where lateral confinement will not permit slopes to be laid back, the excavation should be shored in accordance with OSHA requirements. During excavation, excavated material should not be stockpiled at the top of the slope within a horizontal distance equal to the excavation depth. Provisions for maintaining workman safety within excavations is the sole responsibility of the contractor.

Compaction Testing – It is KSM's recommendation that compaction tests in the excavations and footing trenches be conducted prior to placement of any backfill, steel, or concrete. The in-place density tests should be conducted at every column footing and at a frequency of one test for every 100 linear feet in the footing trench excavations. The subgrade and each lift (12-inch max loose thickness) of fill should be tested for compaction at a frequency of no less than one test per 2,500 sf of building area, per lift, and one test per 10,000 sf of pavement area, per lift, with a minimum of 4 tests in each area prepared. The placement and frequency of testing can be modified at the discretion of the site contractor and the onsite soils technician based on the requirements of the project as stated by the Engineer of Record. In-place density of the compacted soil can be measured using an ASTM approved method to determine percent compaction.

Temporary Dewatering – Given the recorded depths to the groundwater surface, together with the expected scope of earthwork operations, temporary dewatering may be a necessary part of the earthwork operations. The actual method of dewatering should be determined by the contractor. KSM recommends drawing down the water table to a level that is not less than 2 feet below the exposed bottom of excavations to avoid compaction related issues.

Shallow Foundation:

The following design parameters are predicated on the execution of the Site Preparation recommendations above and our experience with similarly loaded structures, as stated in the "Project Description" section of this report. If the designed foundation, based on the parameters provided, exceed our recommended maximum dimensions, the structural engineer should notify our office so that we can review the design foundation and loading conditions, and

provide additional site preparation recommendations, foundation recommendations, and settlement calculations, as needed.

Design Parameters		
Description	**Isolated Footing**	**Continuous Footing**
Estimated Allowable Bearing Pressure	2,500 psf	2,500 psf
Minimum Embedment Below Finished Grade	16 inches	16 inches
Minimum Width	36 inches	16 inches
Approximate Total Settlement	< 1 inch	< 1 inch
Approximate Differential Settlement	< ½ of an inch between similarly loaded columns	< ½ of an inch over 40 feet

Based on the granular nature of the discovered subsurface conditions, we anticipate that the majority of the settlement should occur during the construction and erection of the structure.

Floor Slabs:

A conventional slab-on-grade can be used in the "at grade" portion of the structure. We recommend the disturbed subgrade below the floor slab be re-compacted to 95 percent of the modified Proctor maximum dry density (ASTM D 1557) prior to placement of the concrete. We recommend that control joints be incorporated in the slab at frequent intervals to control shrinkage cracks.

A moisture barrier is recommended beneath the floor slab to prevent moisture migration from the underlying soil resulting in dampness of the slab.

Pavement Design Guidance:

Actual pavement section thickness should be provided by the design civil engineer based on traffic loads, volumes, and the owners design life requirements.

Please refer to the following sections for pavement design considerations, recommendations and opinions for site preparation and minimum pavement sections.

Site Preparation:

1. Clearing and Grubbing – The proposed construction area, plus a minimum margin of five feet beyond the proposed limit of construction, should initially be prepared by removing any organic materials including roots and surface vegetation. Stumps and root systems should be completely removed. Stump grinding is not a recommended method for stump removal.

2. Subgrade Proof-roll and Compaction – The exposed surface, created in step 1 above, should be graded level, moisture conditioned, and compacted. Sufficient passes of the roller should be made to produce an in-place dry density that equals or exceeds 95 percent of the Modified Proctor (ASTM D-1557) maximum dry density to a depth of 2 feet below the exposed surface. Testing should be done to confirm that the specified level of compaction has been achieved. Encountered organic material should be excavated and replaced with suitable fill in accordance with the previously listed recommendations.

3. Fine Grading and Subgrade Preparation for Pavement Section Installation – Immediately prior to the installation of the pavement section, the prepared surface created above shall be fine graded, if necessary, moisture conditioned, and re-compacted to achieve at least 98 percent of its modified Proctor (AASHTO T-180) maximum dry density to a depth of 12-inches below the prepared surface.

Please refer to the following sections for pavement design considerations and recommendations. The following recommended design parameters are predicated on proper execution of the Site Preparation recommendations provided above.

Based on the encountered subsurface conditions, we believe that the site may be prepared to support a flexible pavement or rigid concrete pavement. A minimum of 18 inches of separation should be maintained between the bottom of the base and the seasonal high groundwater table. Grades will need to be reviewed during final design to confirm minimum separation is achievable.

The following table presents the recommended minimum pavement sections.

Minimum Pavement Section			
Pavement Type	**Material**	**Layer Thickness (in)**	
		Standard Duty	**Heavy Duty**
Flexible	Asphalt Surface: FDOT Asphalt Type SP	1.5	2.5
	Base Course: Crushed cemented Coquina Rock or Limerock with a Minimum LBR of 100	6	8
	Stabilized Subbase: Minimum LBR of 40	12	12
Rigid	Portland Cement Concrete: Minimum 28-day compressive strength of 4,000 psi	5	6
	Stabilized Subbase: Minimum LBR of 40	12	12

Flexible Pavement Section – If proposed, we recommend a pavement section consisting of an asphaltic concrete wearing surface on a calcareous base course supported on stabilized subbase over well-compacted subgrade.

- Stabilized Subbase – We recommend the stabilized subbase contain a minimum Limerock Bearing Ratio (LBR) value of 40 (FDOT FM 5-515), is a minimum of 12-inches thick, and compacted to a minimum in-place density of 98 percent (AASHTO T-180).

Due to the observed groundwater table, and estimated high season water table, ***KSM does not recommend the installation of clayey soils for use as stabilized subbase***.

- Base Course – We recommend the base course material consist of crushed cemented coquina rock or limerock, with a minimum LBR value of 100, and a minimum thickness of 6 inches for standard pavements and at least 8 inches for heavy-duty pavements. Base course installed in sections greater than 6 inches should be placed in multiple, equally thick layers, at a maximum of 6 inches in thickness, and compacted to at least 98 percent of its modified Proctor (AASHTO T-180) maximum dry density.

- Asphalt Surface – We recommend an FDOT approved asphaltic wearing surface, with a minimum thickness of 1.5 inches for standard pavement, and a minimum thickness of 2.5 inches for heavy-duty pavement. Pavement with thickness greater than 2.5 inches should be placed and compacted in multiple, equally thick sections. Care must be exercised to place the asphalt over dry, well primed base material.

Rigid Pavement Section – If proposed, we recommend a pavement section consisting of a Portland cement concrete surface, supported on stabilized subbase over well-compacted subgrade.

- Stabilized Subbase – We recommend the stabilized subbase contain a minimum LBR value of 40, is a minimum of 12-inches thick, and compacted to a minimum in-place density of 98 percent (AASHTO T-180). Due to the observed groundwater table, and estimated high season water table, ***KSM does not recommend the installation of clayey soils for use as stabilized subbase***.

- Rigid Concrete Pavement – We recommend a pavement section consisting of portland cement concrete that is 5 to 6 inches minimum in thickness with a minimum 28-day compressive strength of 4,000 psi. Saw cuts should be performed for crack control as soon as the concrete develops the strength needed to prevent aggregate raveling. Steel reinforcement within the concrete pavement, if needed, should be designed by the project civil or structural engineer.

Pavement surfaces should be sloped and designed to allow adequate drainage of surface water. Failure to achieve proper drainage may lead to saturation of the pavement subgrade and subsequent deterioration of the pavement. The implementation of periodic maintenance should slow the rate of deterioration over time

Closure:

Based upon our subsurface investigation at the above-mentioned project location, the reliance of the recommendations presented within this signed and sealed report is predicated on KSM representative's involvement in reviewing design plans and performing/monitoring construction testing services. Any design professional utilizing the information within this report are responsible for confirming the accuracy of the project information and assumptions stated in our report and that the soil parameters presented are adequate for the design of the proposed

project. If additional parameters are required, KSM is to be notified so that our recommendations can be amended as required.

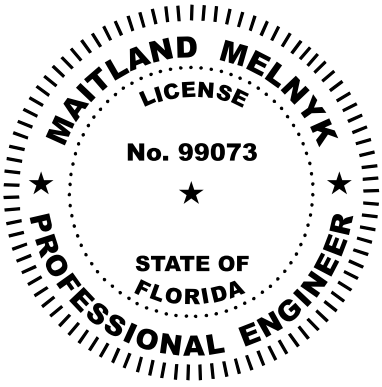
Standard of Care - This report has been prepared in accordance with generally accepted soil and engineering practices and is based on our evaluation of our geotechnical investigation and our stated understanding and assumptions of the proposed project. The procedural standards noted in this report are in reference to methodology in general. In some cases, variations to methods were applied because of local practice or professional judgement. No warranties, either expressed or implied, are intended or made. This report does not reflect any variations which may occur between or away from the borings. If variations appear evident during the course of construction, it would be necessary to re-evaluate the recommendations of this project.

Limitations - Environmental conditions, wetland delineation, karst activity, water quality, and municipal requirements are not a part of this report.

KSM Engineering and Testing should be retained to perform and/or monitor Construction Testing services. If Client elects to not have KSM provide Construction Testing services, the Client shall indemnify and hold KSM and its consultants harmless from and against damages, losses, and judgments arising from claims by Client or any third parties.

We are pleased to have been of assistance to you in this phase of your project. When we may be of further service to you or should you have any questions, please feel free to contact the office.

Respectfully,



Nasir D. Feaster
Nasir D. Feaster
Geotechnical Engineer

Maitland D. Melnyk, P.E.
Geotechnical Engineer
Florida Lic. No. 99073

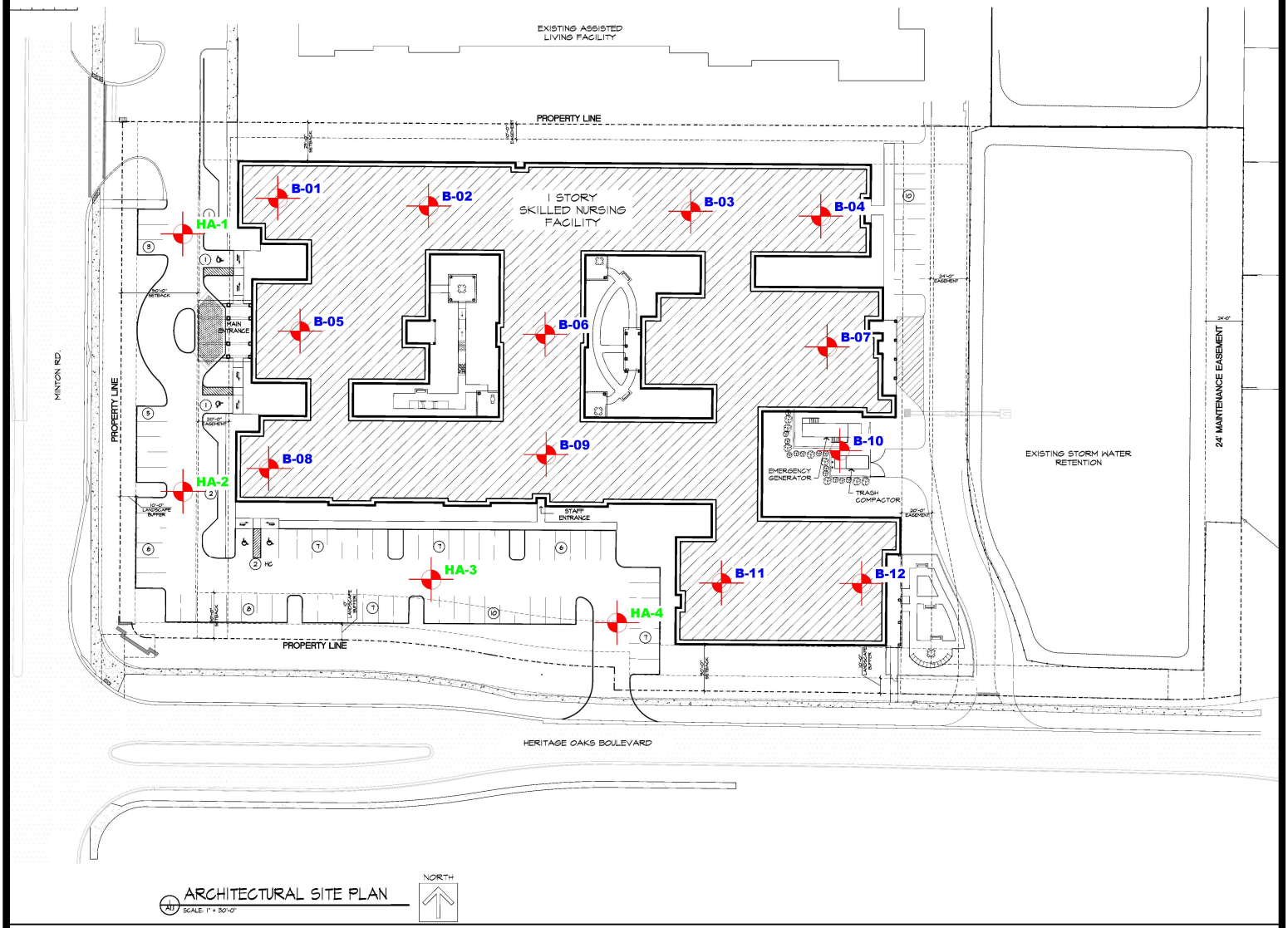
NDF/cv/MDM
Email to: darren.mohle@outlook.com



USDA SOILS SURVEY

19—Riviera sand, 0 to 2 percent slopes

PROJECT: Azalea Skilled Nursing & Memory Care Facility, Minton Rd & Heritage Oaks Blvd, W. Melbourne, FL		
SHEET 1 OF 1 PERMIT #: N/A PROJECT #: 2408005-soils	KSM ENGINEERING AND TESTING	DRAWN BY: C.V. DATE: 20241001 SCALE: NOT TO SCALE



ARCHITECTURAL SITE PLAN
SCALE: 1" = 30'-0"

APPROXIMATE LOCATION OF SOIL TESTING

PROJECT: Azalea Skilled Nursing & Memory Care Facility, Minton Rd & Heritage Oaks Blvd, W. Melbourne, FL

SHEET 1 OF 1
PERMIT #: N/A
PROJECT #: 2408005-b

KSM ENGINEERING AND TESTING

DRAWN BY: C.V.
DATE: 20241001
SCALE: NOT TO SCALE

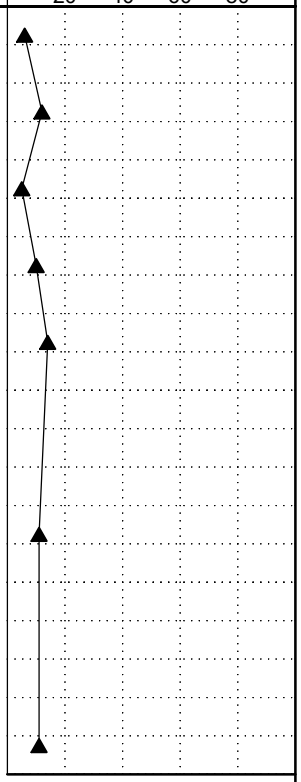
KSM Engineering & Testing
P.O. Box 78-1377
Sebastian, FL 32978
Tel: (772)-589-0712
Fax: (772)-589-6469

BORING NUMBER B-01

CLIENT Architectural Concepts Inc.
PROJECT NAME Azalea Skilled Nursing & Memory Care Facility
PROJECT NUMBER 2408005-b
PROJECT LOCATION Minton Rd & Heritage Oaks Blvd, W. Melbourne, FL
DATE STARTED 9/27/24 **COMPLETED** 9/27/24
GROUND ELEVATION
DRILLING CONTRACTOR
GROUND WATER LEVELS:
DRILLING METHOD SPT Safety Hammer
▽ **AT TIME OF DRILLING** 2.2 ft
LOGGED BY MC, CH
NOTES See Attached Location Plan

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	PENETROMETER	DRY UNIT WT. (pcf)
0		Gray Sand with Trace of Shell Fragments	SS		2-3-3 (6)		
		Light Brown Sand	SS		5-6-6 (12)		
5		Gray Silty Sand	SS		2-2-3 (5)		
		Gray Slightly Silty Sand with Trace of Shell Fragments	SS		2-5-5 (10)		
			SS		6-7-7 (14)		
10							
		Light Gray Slightly Silty Sand with Some Shell Fragments	SS		3-5-6 (11)		
15							
20			SS		5-5-6 (11)		

Bottom of borehole at 20.0 feet.



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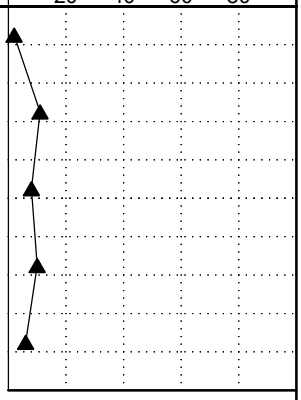
KSM Engineering & Testing
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Sebastian, FL 32978
Tel: (772)-589-0712
Fax: (772)-589-6469

BORING NUMBER B-02

CLIENT Architectural Concepts Inc.
PROJECT NAME Azalea Skilled Nursing & Memory Care Facility
PROJECT NUMBER 2408005-b
PROJECT LOCATION Minton Rd & Heritage Oaks Blvd, W. Melbourne, FL
DATE STARTED 9/27/24 **COMPLETED** 9/27/24
GROUND ELEVATION
DRILLING CONTRACTOR
GROUND WATER LEVELS:
DRILLING METHOD SPT Automatic Hammer
▽ **AT TIME OF DRILLING** 1.6 ft
LOGGED BY NV, OR, AA
NOTES See Attached Location Plan

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	PENETROMETER	DRY UNIT WT. (pcf)
0		Gray Sand with Organics	SS		1-1-1 (2)		
		Light Brown Sand	SS		2-5-6 (11)		
5		Gray Slightly Silty Sand	SS		1-4-4 (8)		
			SS		5-5-5 (10)		
10			SS		4-3-3 (6)		

Bottom of borehole at 10.0 feet.



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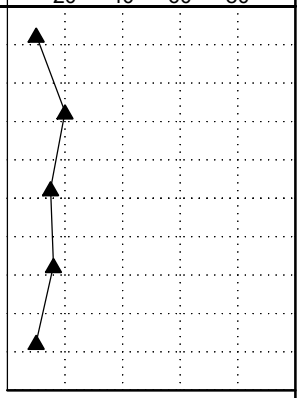
BORING NUMBER B-03

CLIENT Architectural Concepts Inc.
PROJECT NAME Azalea Skilled Nursing & Memory Care Facility
PROJECT NUMBER 2408005-b
PROJECT LOCATION Minton Rd & Heritage Oaks Blvd, W. Melbourne, FL
DATE STARTED 9/27/24 **COMPLETED** 9/27/24
GROUND ELEVATION
DRILLING CONTRACTOR
GROUND WATER LEVELS:
DRILLING METHOD SPT Automatic Hammer
▽ **AT TIME OF DRILLING** 2.6 ft
LOGGED BY NV, OR, AA
NOTES See Attached Location Plan

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	PENETROMETER	DRY UNIT WT. (pcf)
0		Brown Sand	SS		3-4-6 (10)		
		▽ Light Gray Sand	SS		9-10-10 (20)		
5		Gray Slightly Silty Sand	SS		5-5-10 (15)		
			SS		4-8-8 (16)		
10			SS		5-6-4 (10)		

Bottom of borehole at 10.0 feet.

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80



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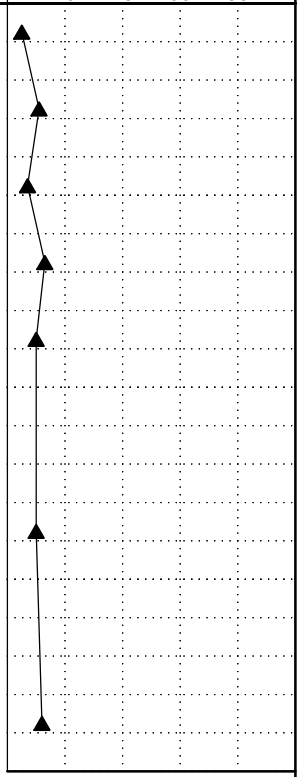
BORING NUMBER B-04

CLIENT Architectural Concepts Inc.
PROJECT NAME Azalea Skilled Nursing & Memory Care Facility
PROJECT NUMBER 2408005-b
PROJECT LOCATION Minton Rd & Heritage Oaks Blvd, W. Melbourne, FL
DATE STARTED 9/27/24 **COMPLETED** 9/27/24
GROUND ELEVATION
DRILLING CONTRACTOR
GROUND WATER LEVELS:
DRILLING METHOD SPT Safety Hammer
▽ **AT TIME OF DRILLING** 2.1 ft
LOGGED BY MC, CH
NOTES See Attached Location Plan

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	PENETROMETER	DRY UNIT WT. (pcf)
0		Gray Slightly Silty Sand	SS		2-2-3 (5)		
		Light Brown Sand	SS		4-5-6 (11)		
5			SS		3-3-4 (7)		
		Gray Slightly Silty Sand	SS		6-5-8 (13)		
			SS		5-5-5 (10)		
10							
		Light Gray Silty Sand with Some Shell Fragments	SS		3-5-5 (10)		
15							
			SS		5-6-6 (12)		
20							

Bottom of borehole at 20.0 feet.

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80



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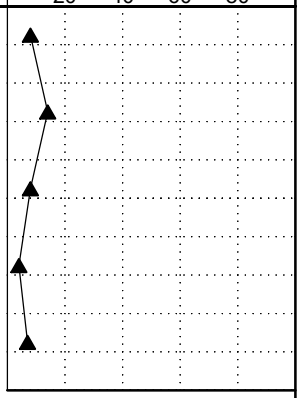
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Fax: (772)-589-6469

BORING NUMBER B-05

CLIENT Architectural Concepts Inc.
PROJECT NAME Azalea Skilled Nursing & Memory Care Facility
PROJECT NUMBER 2408005-b
PROJECT LOCATION Minton Rd & Heritage Oaks Blvd, W. Melbourne, FL
DATE STARTED 9/27/24 **COMPLETED** 9/27/24
GROUND ELEVATION
DRILLING CONTRACTOR
GROUND WATER LEVELS:
DRILLING METHOD SPT Automatic Hammer
▽ **AT TIME OF DRILLING** 2.5 ft
LOGGED BY NV, OR, AA
NOTES See Attached Location Plan

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	PENETROMETER	DRY UNIT WT. (pcf)
0		Brown to Light Brown Sand	SS		2-3-5 (8)		
		▽	SS		6-8-6 (14)		
5		Gray Slightly Silty Sand	SS		5-5-3 (8)		
			SS		2-2-2 (4)		
10			SS		2-3-4 (7)		

Bottom of borehole at 10.0 feet.



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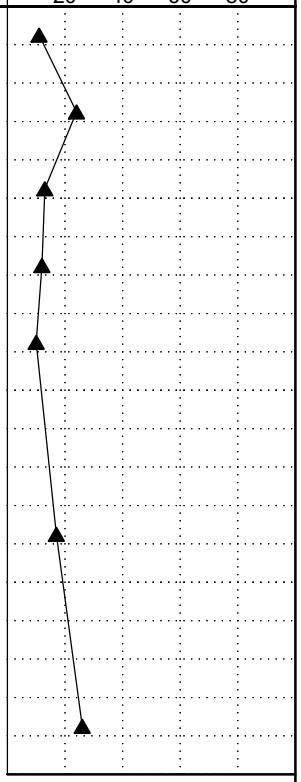
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Sebastian, FL 32978
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Fax: (772)-589-6469

BORING NUMBER B-06

CLIENT Architectural Concepts Inc.
PROJECT NAME Azalea Skilled Nursing & Memory Care Facility
PROJECT NUMBER 2408005-b
PROJECT LOCATION Minton Rd & Heritage Oaks Blvd, W. Melbourne, FL
DATE STARTED 9/27/24 **COMPLETED** 9/27/24
GROUND ELEVATION
DRILLING CONTRACTOR
GROUND WATER LEVELS:
DRILLING METHOD SPT Safety Hammer
▽ **AT TIME OF DRILLING** 2.3 ft
LOGGED BY MC, CH
NOTES See Attached Location Plan

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	PENETROMETER	DRY UNIT WT. (pcf)
0		Brown Clayey Sand	SS		4-5-6 (11)		
		▽ Light Gray Sand	SS		8-11-13 (24)		
5		Gray Slightly Silty Sand	SS		4-5-8 (13)		
			SS		4-5-7 (12)		
		Gray Sand	SS		6-5-5 (10)		
10							
		Gray Sand with Some Cemented Sand	SS		8-7-10 (17)		
15							
			SS		11-10-16 (26)		
20							

Bottom of borehole at 20.0 feet.



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BORING NUMBER B-07

CLIENT Architectural Concepts Inc.
PROJECT NAME Azalea Skilled Nursing & Memory Care Facility
PROJECT NUMBER 2408005-b
PROJECT LOCATION Minton Rd & Heritage Oaks Blvd, W. Melbourne, FL
DATE STARTED 9/27/24 **COMPLETED** 9/27/24
GROUND ELEVATION
DRILLING CONTRACTOR
GROUND WATER LEVELS:
DRILLING METHOD SPT Automatic Hammer
▽ **AT TIME OF DRILLING** 1.5 ft
LOGGED BY NV, OR, AA
NOTES See Attached Location Plan

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	PENETROMETER	DRY UNIT WT. (pcf)
0		Brown to Light Brown Sand ▽	SS		4-6-8 (14)		
			SS		4-10-12 (22)		
5			SS		3-6-10 (16)		
			SS		3-8-6 (14)		
		Gray Silty Sand	SS		4-5-4 (9)		
10							

Bottom of borehole at 10.0 feet.

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

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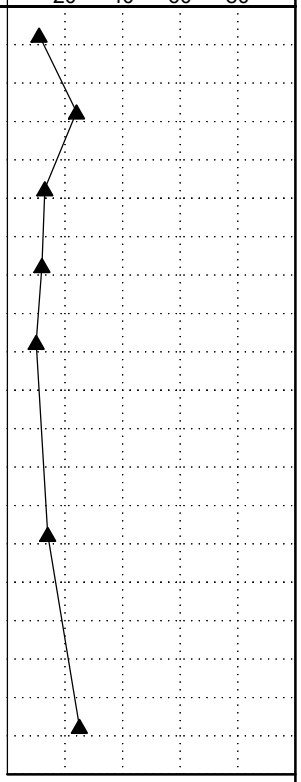
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Sebastian, FL 32978
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Fax: (772)-589-6469

BORING NUMBER B-08

CLIENT Architectural Concepts Inc.
PROJECT NAME Azalea Skilled Nursing & Memory Care Facility
PROJECT NUMBER 2408005-b
PROJECT LOCATION Minton Rd & Heritage Oaks Blvd, W. Melbourne, FL
DATE STARTED 9/27/24 **COMPLETED** 9/27/24
GROUND ELEVATION
DRILLING CONTRACTOR
GROUND WATER LEVELS:
DRILLING METHOD SPT Safety Hammer
▽ **AT TIME OF DRILLING** 2.2 ft
LOGGED BY MC, CH
NOTES See Attached Location Plan

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	PENETROMETER	DRY UNIT WT. (pcf)
0		Brown Clayey Sand	SS		4-5-6 (11)		
		▽ Light Gray Sand	SS		8-11-13 (24)		
5		Gray Slightly Silty Sand	SS		4-5-8 (13)		
			SS		4-5-7 (12)		
		Gray Sand	SS		6-5-5 (10)		
10							
		Gray Sand with Some Cemented Sand	SS		8-7-7 (14)		
15							
			SS		11-10-15 (25)		
20							

Bottom of borehole at 20.0 feet.



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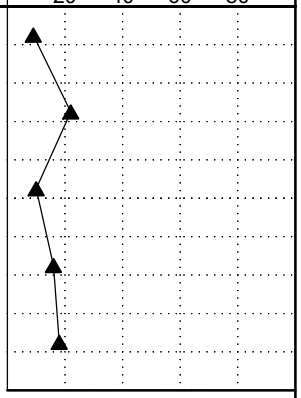
KSM Engineering & Testing
P.O. Box 78-1377
Sebastian, FL 32978
Tel: (772)-589-0712
Fax: (772)-589-6469

BORING NUMBER B-09

CLIENT Architectural Concepts Inc.
PROJECT NAME Azalea Skilled Nursing & Memory Care Facility
PROJECT NUMBER 2408005-b
PROJECT LOCATION Minton Rd & Heritage Oaks Blvd, W. Melbourne, FL
DATE STARTED 9/28/24 **COMPLETED** 9/28/24
GROUND ELEVATION
DRILLING CONTRACTOR
GROUND WATER LEVELS:
DRILLING METHOD SPT Automatic Hammer
▽ **AT TIME OF DRILLING** 2.1 ft
LOGGED BY MC, CH
NOTES See Attached Location Plan

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	PENETROMETER	DRY UNIT WT. (pcf)
0		Gray Slightly Silty Sand	SS		1-3-6 (9)		
		Light Gray Sand	SS		9-11-11 (22)		
5		Gray Slightly Silty Sand	SS		4-4-6 (10)		
			SS		6-8-8 (16)		
10			SS		4-8-10 (18)		

Bottom of borehole at 10.0 feet.



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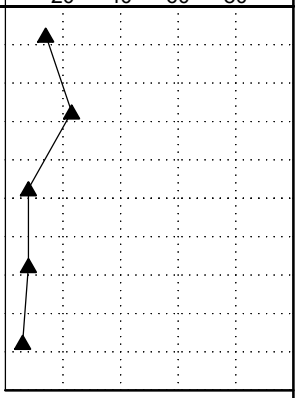
BORING NUMBER B-10

CLIENT Architectural Concepts Inc.
PROJECT NAME Azalea Skilled Nursing & Memory Care Facility
PROJECT NUMBER 2408005-b
PROJECT LOCATION Minton Rd & Heritage Oaks Blvd, W. Melbourne, FL
DATE STARTED 9/27/24 **COMPLETED** 9/27/24
GROUND ELEVATION
DRILLING CONTRACTOR
GROUND WATER LEVELS:
DRILLING METHOD SPT Automatic Hammer
▽ **AT TIME OF DRILLING** 1.8 ft
LOGGED BY NV, OR, AA
NOTES See Attached Location Plan

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	PENETROMETER	DRY UNIT WT. (pcf)
0		Gray Slightly Silty Sand with Trace of Shell Fragments	SS		4-6-8 (14)		
		Light Gray Sand	SS		8-13-10 (23)		
5		Gray Slightly Silty Sand	SS		5-3-5 (8)		
			SS		4-5-3 (8)		
10			SS		4-4-2 (6)		

Bottom of borehole at 10.0 feet.

▲ SPT N VALUE ▲
20 40 60 80
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80



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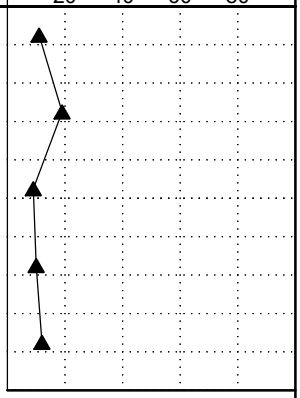
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Sebastian, FL 32978
Tel: (772)-589-0712
Fax: (772)-589-6469

BORING NUMBER B-11

CLIENT Architectural Concepts Inc.
PROJECT NAME Azalea Skilled Nursing & Memory Care Facility
PROJECT NUMBER 2408005-b
PROJECT LOCATION Minton Rd & Heritage Oaks Blvd, W. Melbourne, FL
DATE STARTED 9/27/24 **COMPLETED** 9/27/24
GROUND ELEVATION
DRILLING CONTRACTOR
GROUND WATER LEVELS:
DRILLING METHOD SPT Automatic Hammer
▽ **AT TIME OF DRILLING** 2.1 ft
LOGGED BY NV, OR, AA
NOTES See Attached Location Plan

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	PENETROMETER	DRY UNIT WT. (pcf)
0		Gray Slightly Silty Sand	SS		1-5-6 (11)		
		▽ Light Gray Sand	SS		9-8-11 (19)		
5		Gray Slightly Silty Sand	SS		4-4-5 (9)		
			SS		3-4-6 (10)		
10			SS		4-4-8 (12)		

Bottom of borehole at 10.0 feet.



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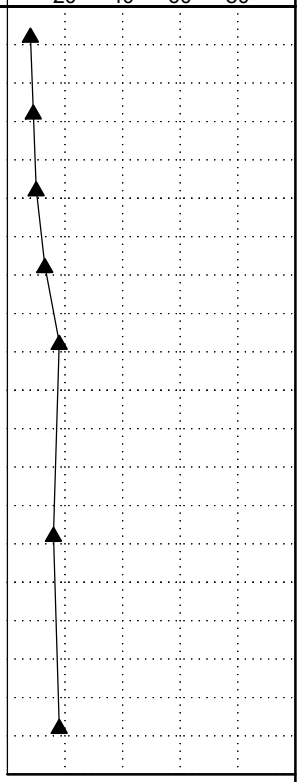
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Sebastian, FL 32978
Tel: (772)-589-0712
Fax: (772)-589-6469

BORING NUMBER B-12

CLIENT Architectural Concepts Inc.
PROJECT NAME Azalea Skilled Nursing & Memory Care Facility
PROJECT NUMBER 2408005-b
PROJECT LOCATION Minton Rd & Heritage Oaks Blvd, W. Melbourne, FL
DATE STARTED 9/27/24 **COMPLETED** 9/27/24
GROUND ELEVATION
DRILLING CONTRACTOR
GROUND WATER LEVELS:
DRILLING METHOD SPT Safety Hammer
▽ **AT TIME OF DRILLING** 2.4 ft
LOGGED BY MC, CH
NOTES See Attached Location Plan

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	PENETROMETER	DRY UNIT WT. (pcf)
0		Gray Sand	SS		3-3-5 (8)		
		▽ Brown Slightly Silty Sand	SS		4-6-3 (9)		
5		Light Gray Silty Sand with Some Shell Fragments	SS		4-5-5 (10)		
			SS		5-6-7 (13)		
10			SS		7-9-9 (18)		
		Gray Sand with Some Cemented Sand	SS		7-8-8 (16)		
15							
			SS		7-9-9 (18)		
20							

Bottom of borehole at 20.0 feet.



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BORING NUMBER HA-1

CLIENT Architectural Concepts Inc.
PROJECT NAME Azalea Skilled Nursing & Memory Care Facility
PROJECT NUMBER 2408005-b
PROJECT LOCATION Minton Rd & Heritage Oaks Blvd, W. Melbourne, FL
DATE STARTED 9/27/24 **COMPLETED** 9/27/24
GROUND ELEVATION
DRILLING CONTRACTOR
GROUND WATER LEVELS:
DRILLING METHOD Auger Boring
▽ **AT TIME OF DRILLING** 2.0 ft
LOGGED BY MC, CH
NOTES See Attached Location Plan

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	PENETROMETER	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
0		Gray Slightly Silty Sand with Trace of Shell Fragments				30		
		▽ Gray Sand				30 35		
						35 40		
5		Light Gray Sand				45		

Bottom of borehole at 6.0 feet.

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Sebastian, FL 32978
Tel: (772)-589-0712
Fax: (772)-589-6469

BORING NUMBER HA-2

CLIENT Architectural Concepts Inc.
PROJECT NAME Azalea Skilled Nursing & Memory Care Facility
PROJECT NUMBER 2408005-b
PROJECT LOCATION Minton Rd & Heritage Oaks Blvd, W. Melbourne, FL
DATE STARTED 9/27/24 **COMPLETED** 9/27/24
GROUND ELEVATION
DRILLING CONTRACTOR
GROUND WATER LEVELS:
DRILLING METHOD Auger Boring
▽ **AT TIME OF DRILLING** 2.0 ft
LOGGED BY MC, CH
NOTES See Attached Location Plan

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	PENETROMETER	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
0		Gray Slightly Silty Sand with Trace of Shell Fragments				30		
		▽ Gray Sand				35		
						35		
						40		
		Light Brown Sand				45		
5						45		

Bottom of borehole at 6.0 feet.

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Tel: (772)-589-0712
Fax: (772)-589-6469

BORING NUMBER HA-3

CLIENT Architectural Concepts Inc.
PROJECT NAME Azalea Skilled Nursing & Memory Care Facility
PROJECT NUMBER 2408005-b
PROJECT LOCATION Minton Rd & Heritage Oaks Blvd, W. Melbourne, FL
DATE STARTED 9/27/24 **COMPLETED** 9/27/24
GROUND ELEVATION
DRILLING CONTRACTOR
GROUND WATER LEVELS:
DRILLING METHOD Auger Boring
▽ **AT TIME OF DRILLING** 2.1 ft
LOGGED BY MC, CH
NOTES See Attached Location Plan

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	PENETROMETER	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
0		Gray Sand				30		
		▽				30		
						35		
						40		
						45		
5		Gray Slightly Silty Sand				45		

Bottom of borehole at 6.0 feet.

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KSM Engineering & Testing
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Sebastian, FL 32978
Tel: (772)-589-0712
Fax: (772)-589-6469

BORING NUMBER HA-4

CLIENT Architectural Concepts Inc.
PROJECT NAME Azalea Skilled Nursing & Memory Care Facility
PROJECT NUMBER 2408005-b
PROJECT LOCATION Minton Rd & Heritage Oaks Blvd, W. Melbourne, FL
DATE STARTED 9/27/24 **COMPLETED** 9/27/24
GROUND ELEVATION
DRILLING CONTRACTOR
GROUND WATER LEVELS:
DRILLING METHOD Auger Boring
▽ **AT TIME OF DRILLING** 2.2 ft
LOGGED BY MC, CH
NOTES See Attached Location Plan

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	PENETROMETER	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
0		Gray Sand				30		
		▽				35		
						35		
						40		
						45		
5						45		

Bottom of borehole at 6.0 feet.

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DOCUMENT 004321 - ALLOWANCE FORM

1.1 BID INFORMATION

A. Bidder: _____.

B. Project Name: Oceancrest Health and Rehabilitation Center.

C. Project Location: Minton Road at Heritage Oaks Blvd., West Melbourne, Florida.

D. Owner: Brevard Realty Investor Holdings LLS.

E. Architect: Architectural Concepts, Inc.

F. Architect Project Number: 1966.

1.2 BID FORM SUPPLEMENT

A. This form is required to be attached to the Bid Form.

B. The undersigned Bidder certifies that Base Bid submission to which this Bid Supplement is attached includes those allowances described in the Contract Documents and scheduled in Section 012100 "Allowances."

1.3 SUBMISSION OF BID SUPPLEMENT

A. Respectfully submitted this ____ day of _____, 2025.

B. Submitted By:_____(Insert name of bidding firm or corporation).

C. Authorized Signature:_____(Handwritten signature).

D. Signed By:_____(Type or print name).

E. Title:_____(Owner/Partner/President/Vice President).

END OF DOCUMENT 004321

DOCUMENT 004323 - ALTERNATES FORM

1.1 BID INFORMATION

A. Bidder: _____.

B. Prime Contract: _____.

C. Project Name: Oceancrest Health and Rehabilitation Center.

D. Project Location: Minton Road at Heritage Oaks Blvd., West Melbourne, Florida.

E. Owner: Brevard Realty Investor Holdings LLS.

F. Architect: Architectural Concepts, Inc.

G. Architect Project Number: 1966.

1.2 BID FORM SUPPLEMENT

A. This form is required to be attached to the Bid Form.

1.3 DESCRIPTION

A. The undersigned Bidder proposes the amount below be added to or deducted from the Base Bid if particular alternates are accepted by Owner. Amounts listed for each alternate include costs of related coordination, modification, or adjustment.

1. Cost-Plus-Fee Contract: Alternate price given below includes adjustment to Contractor's Fee.

B. If the alternate does not affect the Contract Sum, the Bidder shall indicate "NO CHANGE."

C. If the alternate does not affect the Work of this Contract, the Bidder shall indicate "NOT APPLICABLE."

D. The Bidder shall be responsible for determining from the Contract Documents the affects of each alternate on the Contract Time and the Contract Sum.

E. Owner reserves the right to accept or reject any alternate, in any order, and to award or amend the Contract accordingly within 60 days of the Notice of Award unless otherwise indicated in the Contract Documents.

F. Acceptance or non-acceptance of any alternates by the Owner shall have no affect on the Contract Time unless the "Schedule of Alternates" Article below provides a formatted space for the adjustment of the Contract Time.

1.4 SCHEDULE OF ALTERNATES

A. Alternate No. <**Insert number**>: <**Insert title of alternate**>:

1. ADD____ DEDUCT____ NO CHANGE____ NOT APPLICABLE____.
2. _____ Dollars ($_____).
3. ADD____ DEDUCT____ calendar days to adjust the Contract Time for this alternate.

1.5 SUBMISSION OF BID SUPPLEMENT

A. Respectfully submitted this ____ day of _____, 2025.

B. Submitted By:_____(Insert name of bidding firm or corporation).

C. Authorized Signature:_____(Handwritten signature).

D. Signed By:_____(Type or print name).

E. Title:_____(Owner/Partner/President/Vice President).

END OF DOCUMENT 004323

SECTION 006000 - PROJECT FORMS

1.1 FORM OF AGREEMENT AND GENERAL CONDITIONS

A. One of the following forms of Owner/Contractor Agreement and form of the General Conditions shall be used for Project subject to agreement by Owner and Contractor:

1. AIA Document A101-2017 "Standard Form of Agreement between Owner and Contractor Where the Basis of Payment is a Stipulated Sum."

    a. The General Conditions for Project are AIA Document A201-2017 "General Conditions of the Contract for Construction."

2. AIA Document A102-2017 "Standard Form of Agreement between Owner and Contractor Where the Basis of Payment is the Cost of the Work Plus a Fee with a Guaranteed Maximum Price."

    a. The General Conditions for Project are AIA Document A201-2017 "General Conditions of the Contract for Construction."

3. AIA Document A103-2017 "Standard Form of Agreement between Owner and Contractor Where the Basis of Payment is the Cost of the Work Plus a Fee without a Guaranteed Maximum Price."

    a. The General Conditions for Project are AIA Document A201-2017 "General Conditions of the Contract for Construction."

4. AIA Document A133-2019 "Standard Form of Agreement between Owner and Construction Manager as Constructor Where the Basis of Payment is the Cost of the Work Plus a Fee with a Guaranteed Maximum Price."

    a. The General Conditions for Project are AIA Document A201-2017 "General Conditions of the Contract for Construction."

5. The General Conditions are incorporated by reference.

1.2 ADMINISTRATIVE FORMS

A. Administrative Forms: Additional administrative forms are specified in Division 01 General Requirements.

B. Copies of AIA standard forms may be obtained from the American Institute of Architects; www.aiacontractdocsaiacontracts.org; (800) 942-7732.

C. Preconstruction Forms:

1. Form of Performance Bond and Labor and Material Bond: AIA Document A312-2010 "Performance Bond and Payment Bond."

2. Form of Certificate of Insurance: AIA Document G715-2017 "Supplemental Attachment for ACORD Certificate of Insurance 25."

D. Information and Modification Forms:

1. Form for Requests for Information (RFIs): AIA Document G716-2004 "Request for Information (RFI)."
2. Form of Request for Proposal: AIA Document G709-2018 "Proposal Request."
3. Change Order Form: AIA Document G701-2017 "Change Order."
4. Form of Architect's Memorandum for Minor Changes in the Work: AIA Document G710-2017 "Architect's Supplemental Instructions."
5. Form of Change Directive: AIA Document G714-2017 "Construction Change Directive."

E. Payment Forms:

1. Schedule of Values Form: AIA Document G703-1992 "Continuation Sheet."
2. Payment Application: AIA Document G702-1992/703-1992 "Application and Certificate for Payment and Continuation Sheet."
3. Form of Contractor's Affidavit: AIA Document G706-1994 "Contractor's Affidavit of Payment of Debts and Claims."
4. Form of Affidavit of Release of Liens: AIA Document G706A-1994 "Contractor's Affidavit of Payment of Release of Liens."
5. Form of Consent of Surety: AIA Document G707-1994 "Consent of Surety to Final Payment."

END OF SECTION 006000

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Section 012100 "Allowances" for products selected under an allowance.
2. Section 012300 "Alternates" for products selected under an alternate.
3. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 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.
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.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use CSI Form 13.1A.
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. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses 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, FBC, NFPA or approved alternate agency.
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 Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

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.

1.5 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.

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 20 days prior to time required for preparation and review of related submittals.

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 is consistent with the Contract Documents and will produce indicated results.
b. Substitution request is fully documented and properly submitted.
c. Requested substitution will not adversely affect Contractor's construction schedule.
d. Requested substitution has received necessary approvals of authorities having jurisdiction.
e. Requested substitution is compatible with other portions of the Work.
f. Requested substitution has been coordinated with other portions of the Work.
g. Requested substitution provides specified warranty.
h. 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 if received within 60 days after the Notice to Proceed. 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.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. Related Requirements:

1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.
2. Section 013100 "Project Management and Coordination" for requirements for forms for contract modifications provided as part of web-based Project management software.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710 written instructions on letterhead or web-based Project management software as is deemed appropriate.

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request or 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor and supervision directly attributable to the change.

d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
e. Quotation Form: Use forms acceptable to Architect and/or form provided as part of web-based Project management software.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use form acceptable to Architect and/or form provided as part of web-based Project management software.

1.5 ADMINISTRATIVE CHANGE ORDERS

A. Allowance Adjustment: See Section 012100 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.

B. Unit-Price Adjustment: See Section 012200 "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.6 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Change Proposal Request, Contractor will issue a Change Order for signatures of Owner and Contractor on AIA Document G701 or form provided as part of web-based Project management software.

1.7 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714, company letterhead, or form provided as part of web-based Project

management software. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.8 WORK CHANGE DIRECTIVE

A. Work Change Directive: Architect may issue a Work Change Directive on company letterhead or form provided as part of web-based Project management software. Work Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Work Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:

1. Document 004373 "Proposed Schedule of Values Form" for requirements for furnishing proposed schedule of values with bid.
2. Section 012100 "Allowances" for procedural requirements governing the handling and processing of allowances.
3. Section 012200 "Unit Prices" for administrative requirements governing the use of unit prices.
4. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
5. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
2. Submit the schedule of values to Architect at earliest possible date, but no later than five days before the date scheduled for submittal of initial Applications for Payment.
3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.

4. Subschedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values coordinated with each element.
5. Subschedules for Separate Design Contracts: Where the Owner has retained design professionals under separate contracts who will each provide certification of payment requests, provide subschedules showing values coordinated with the scope of each design services contract, as described in Section 011000 "Summary."

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

    a. Project name and location.
    b. Owner's name.
    c. Owner's Project number.
    d. Name of Architect.
    e. Architect's Project number.
    f. Contractor's name and address.
    g. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703 as modified in the sample below.
3. Arrange the schedule of values in tabular form, with separate columns to indicate the following for each item listed:

    a. Related Specification Section or division.
    b. Description of the Work.
    c. Scheduled value.
    d. Internal transfers.
    e. Revised scheduled value.
    f. Change Orders (numbers) that affect value.
    g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent. Round dollar amounts to whole dollars, with total equal to Contract Sum.

        1) Labor.
        2) Materials.
        3) Equipment.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum. (refer to sample modified AIA Document G703 below)
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

    a. Differentiate between items stored on-site and items stored off-site.

6. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
7. Purchase Contracts: Provide a separate line item in the schedule of values for each Purchase contract. Show line-item value of Purchase contract. Indicate Owner payments or deposits, if any, and balance to be paid by Contractor.
8. Overhead Costs, Proportional Distribution: Include total cost and proportionate share of general overhead and profit for each line item.
9. Overhead Costs, Separate Line Items: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
10. Temporary Facilities: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
11. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments, as certified by Architect and paid for by Owner.

B. Payment Application Times: The date for each progress payment is indicated in the Owner/Contractor Agreement. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Payment Application Times: Submit Application for Payment to Architect by the last day of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.

1. Submit draft copy of Application for Payment five days prior to due date for review by Architect.

D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as modified in sample below as form for Applications for Payment.

1. Other Application for Payment forms proposed by the Contractor may be acceptable to Architect and Owner. Submit forms for approval with initial submittal of schedule of values.

E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.

3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

F. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:

    a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
    b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
    c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
4. Architect shall retain the right to reject payment on any materials ordered excessively ahead of their scheduled installation factoring in standard lead times.

G. Transmittal: Submit signed and notarized digital copy of Application for Payment to Architect by a method ensuring receipt within 24 hours. Application shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.

I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.

2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
5. Products list (preliminary if not final).
6. Sustainable design action plans, including preliminary project materials cost data.
7. Schedule of unit prices.
8. Submittal schedule (preliminary if not final).
9. List of Contractor's staff assignments.
10. List of Contractor's principal consultants.
11. Copies of building permits.
12. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
13. Initial progress report.
14. Report of preconstruction conference.
15. Certificates of insurance and insurance policies.
16. Performance and payment bonds.
17. Data needed to acquire Owner's insurance.

J. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.

    a. Complete administrative actions, submittals, and Work preceding this application, as described in Section 017700 "Closeout Procedures."

2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

K. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Certification of completion of final punch list items.
3. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
4. Updated final statement, accounting for final changes to the Contract Sum.
5. AIA Document G706.
6. AIA Document G706A.
7. AIA Document G707.
8. Evidence that claims have been settled.
9. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
10. Final liquidated damages settlement statement.
11. Proof that taxes, fees, and similar obligations are paid.
12. Waivers and releases.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 Sample:

A	B	C1	C2	C3	C4	D	E	F	G	H	I	J
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	INTERNAL TRANSFERS	APPROVED CHANGE ORDERS	REVISED SCHEDULED VALUE	WORK COMPLETED: PREVIOUS APPLICATIONS (D + E)	WORK COMPLETED: THIS PERIOD	STORED MATERIALS (NOT IN D OR E)	TOTAL COMPLETED & STORED TO DATE (D + E + F)	% (G ÷ C4)	BALANCE TO FINISH (C4 - G)	RETAINAGE
1.00	**General Conditions**											
1.01	Project Management											
1.02	General Superintendent											
1.03	Superintendents											
1.04	Safety Engineer											
1.05	Scheduling											
1.06	Field Engineering											
1.07	Bonds											
1.08	Trailer Mobile / Demobile											
1.09	Fencing											
1.10	Temp Elec Service - Trailer											
1.11	Temp Water											
1.12	Toilets											
1.13	Field Office Expenses											
1.14	Building Permit											
1.15	Clean-Up											
1.16	Final Cleaning											
1.17	As-Built Drawings											
3.00	**Concrete**											
3.01	AL Footings and Foundations											
3.02	MC Footings and Foundations											
3.03	Vapor Barrier											
3.04	AL SOG											
3.05	MC SOG											
4.00	**Masonry**											
4.01	Face Brick											
4.02	Ground Face Block											
4.03	Block, Grout & Bond Beams											
4.04	Flashing											
4.05	Insulation											
4.06	Precast											
4.07	Masonry Accessories											
5.00	**Structural Steel**											
5.01	Structural Steel material											
5.02	Steel Joist and Metal Deck											
5.03	Structural Detailing											
5.04	Structural Erection											
5.05	Steel stairs and railings											
5.06	Steel ladders											
5.07	Misc. trim & supports											
5.08	Bollards, lintels, etc.											
6.00	**Carpentry**											
6.01	Rough Carpentry											

A	B	C1	C2	C3	C4	D	E	F	G	H	I	J
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	INTERNAL TRANSFERS	APPROVED CHANGE ORDERS	REVISED SCHEDULED VALUE	WORK COMPLETED: PREVIOUS APPLICATIONS (D + E)	WORK COMPLETED: THIS PERIOD	STORED MATERIALS (NOT IN D OR E)	TOTAL COMPLETED & STORED TO DATE (D + E + F)	% (G ÷ C4)	BALANCE TO FINISH (C4 - G)	RETAINAGE
6.02	AL First Floor Blocking/Framing											
6.03	AL Second Floor Blocking/Framing											
6.04	AL Roof Trusses											
6.05	AL Roof Deck											
6.06	MC Blocking/Framing											
6.07	MC Trusses											
6.08	MC Roof Deck											
6.09	Finish Carpentry											
7.00	**Thermal & Moisture Protection**											
7.01	Foundation Waterproofing											
7.02	Metal Wall Panels											
7.03	Roof Insulation											
7.04	EPDM Roofing											
7.05	Sheet Metal Flashing and Trim											
7.06	Manf. Roof Spec											
7.07	Roof Expansion Assemblies											
7.08	Roof Hatches											
7.09	Membrane Air and Water Barrier											
7.10	Caulking											
8.00	**Doors & Windows**											
8.01	Doors & Hardware											
8.02	Aluminum framing and glazing											
8.03	Interior glass											
8.04	Skylights											
9.00	**Finishes**											
9.01	Metal Stud Framing											
9.02	Wallboard											
9.03	Insulation											
9.04	Ceramic Tile											
9.05	Acoustical Ceilings											
9.06	Resilient Flooring											
9.07	Painting											
10.00	**Specialties**											
10.01	Signage											
10.02	Toilet Compartments											
10.03	Toilet Accessories											
10.04	Fire Extinguishers & Cabinets											
10.05	Lockers											
10.06	Postal Boxes											
10.07	Shelving											
10.08	Misc. Specialties											
11.00	**Equipment**											
11.01	Loading Dock Equipment											

A	B	C1	C2	C3	C4	D	E	F	G	H	I	J
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	INTERNAL TRANSFERS	APPROVED CHANGE ORDERS	REVISED SCHEDULED VALUE	WORK COMPLETED: PREVIOUS APPLICATIONS (D + E)	WORK COMPLETED: THIS PERIOD	STORED MATERIALS (NOT IN D OR E)	TOTAL COMPLETED & STORED TO DATE (D + E + F)	% (G ÷ C4)	BALANCE TO FINISH (C4 - G)	RETAINAGE
11.02	Residential Appliances											
11.03	Foodservice Equipment											
11.04	Patient Care Equipment											
11.05	Waste Compactor											
12.00	**Furnishings**											
12.01	Window Treatments											
12.02	Residential Casework											
12.03	Commercial Casework											
12.04	Residential Countertops											
12.05	Commercial Countertops											
12.06	Entry Mats/Grilles											
12.07	Fixed Seating											
14.00	**Elevator**											
14.01	Project Management											
14.10	Permits/Inspections											
21.00	**Fire Suppression**											
21.01	Underground and Riser											
21.02	AL First Floor Rough-in											
21.03	AL Second Floor Rough-in											
21.04	AL Attic Rough-in											
21.05	MC Rough-in											
21.06	MC Attic Rough-in											
21.07	Fire Pump											
22.00	**Plumbing**											
22.01	Mobilization/De-Mobilization											
22.02	Temporary Water											
22.03	Site Underground											
22.04	AL Underground											
22.05	MC Underground											
22.06	AL First Floor Rough-in											
22.07	AL Second Floor Rough-in											
22.08	MC Rough-in											
22.09	Pumps/Softeners/Boilers											
22.10	AL First Floor Fixtures & Trim											
22.11	AL Second Floor Fixtures & Trim											
22.12	MC Fixtures & Trim											
22.13	Med Gas Piping											
22.14	Water Coolers											
23.00	**Heating, Ventilation & A/C (HVAC)**											
23.01	AL First Floor Duct Rough-in											
23.02	AL Second Floor Duct Rough-in											
23.03	AL Attic Duct Rough-in											
23.04	MC Duct Rough-in											

A	B	C1	C2	C3	C4	D	E	F	G	H	I	J
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	INTERNAL TRANSFERS	APPROVED CHANGE ORDERS	REVISED SCHEDULED VALUE	WORK COMPLETED: PREVIOUS APPLICATIONS (D + E)	WORK COMPLETED: THIS PERIOD	STORED MATERIALS (NOT IN D OR E)	TOTAL COMPLETED & STORED TO DATE (D + E + F)	% (G ÷ C4)	BALANCE TO FINISH (C4 - G)	RETAINAGE
23.05	MC Attic Duct Rough-in											
23.06	AL First Floor Equipment											
23.07	AL Second Floor Equipment											
23.08	AL Rooftop Equipment											
23.09	MC Equipment											
23.10	MC Rooftop Equipment											
23.11	Storm Underground											
23.12	Sanitary Aboveground											
23.13	Storm Aboveground											
23.14	Gas Piping											
26.00	**Electrical**											
26.01	Mobilization/De-Mobilization											
26.02	Temporary Electric & Comm											
26.03	Site Underground											
26.04	AL Underground											
26.05	MC Underground											
26.06	AL Switchgear											
26.07	MC Switchgear											
26.08	AL First Floor Rough-in											
26.09	AL Second Floor Rough-in											
26.10	MC Rough-in											
26.11	AL First Floor Wire Pull											
26.12	AL Second Floor Wire Pull											
26.13	MC Wire Pull											
26.14	Switchbrds/Panelbrds/Bus Assy											
26.15	Generator & Transfer Switches											
26.16	Lightning Protection											
26.17	Site Fixtures											
26.18	AL First Floor Fixtures											
26.19	AL Second Floor Fixtures											
26.20	MC Fixtures											
26.22	AL First Floor Trim											
26.23	AL Second Floor Trim											
26.24	MC Trim											
27.00	**Communications**											
27.01	AL First Floor Special Systems											
27.02	AL Second Floor Special Systems											
27.03	MC Special Systems											
27.06	Nurse Call											
27.07	Telephone cable & fiber											
27.08	Voice & Data system											
27.09	Public Address system											
28.00	**Electronic Safety & Security**											

A	B	C1	C2	C3	C4	D	E	F	G	H	I	J
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	INTERNAL TRANSFERS	APPROVED CHANGE ORDERS	REVISED SCHEDULED VALUE	WORK COMPLETED: PREVIOUS APPLICATIONS (D + E)	WORK COMPLETED: THIS PERIOD	STORED MATERIALS (NOT IN D OR E)	TOTAL COMPLETED & STORED TO DATE (D + E + F)	% (G ÷ C4)	BALANCE TO FINISH (C4 - G)	RETAINAGE
28.01	Access Control Hardware											
28.02	Video Surveillance											
28.03	Fire Alarm Systems											
31.00	**Site Work**											
31.01	Mobilization											
31.02	Erosion & Sedimentation											
31.03	Demolition											
31.04	Clearing & Grubbing											
31.05	Topsoil, Strip, Stock, Respread											
31.06	Earthwork											
31.07	Sanitary - Placement/Relocation											
31.08	Storm - Placement/Relocation											
31.09	Water Lines											
31.10	Building Excavation and Backfill											
32.00	**Exterior Improvements**											
32.01	Drive Base											
32.02	Sidewalks and Curbs											
32.03	Asphalt Placement											
32.04	Pavers											
32.05	Parking Painting & Signage											
32.06	Fencing											
32.07	Irrigation											
32.08	Landscaping											
32.09	Demobilization											
	SUB-TOTAL											
	Change Order No. 1											
	Change Order No. 2											
	Change Order No. 3											
	Change Order No. 4											
	Change Order No. 5											
	Change Order No. 6											
	Change Order No. 7											
	Change Order No. 8											
	Change Order No. 9											
	Change Order No. 10											
	GRAND TOTALS											

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 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. RFIs.
4. Digital project management procedures.
5. Web-based Project management software package.
6. 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.
4. Section 019113 "General Commissioning Requirements" for coordinating the Work with Owner's Commissioning Authority.

1.3 DEFINITIONS

A. BIM: Building Information Modeling.

B. RFI: Request for Information. Request from Owner,Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 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. Include the following information in tabular form:

1. Name, address, telephone number, and email address 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 15 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, 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.

1. Post copies of list in Project meeting room, in temporary field office, in web-based Project software directory, and in prominent location inbuilt facility. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction 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 to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Coordination of Multiple Contracts: Each contractor shallcoordinate 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 own 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.

C. 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.

D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and scheduled 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.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated 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 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 Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative 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 plenums to accommodate layout of light fixtures and other components 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 (32 mm) in diameter and larger.
    b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
    c. Panel board, switchboard, 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, in general, 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 suitable modifications and resubmit.
10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 013300 "Submittal Procedures."

C. Coordination Drawing Process: Prepare coordination drawings in the following manner:

1. Schedule submittal and review of Fire Sprinkler, Plumbing, HVAC, and Electrical Shop Drawings to make required changes prior to preparation of coordination drawings.

2. Commence routing of coordination drawing files with HVAC Installer, who will provide drawing plan files denoting approved ductwork. HVAC Installer will locate ductwork and piping on a single layer, using orange color. Forward drawings to Plumbing Installer.
3. Plumbing Installer will locate plumbing and equipment on a single layer, using blue color.
4. Fire Sprinkler Installer will locate piping and equipment, using red color. Fire Sprinkler Installer shall forward drawing files to Electrical Installer.
5. Electrical Installer will indicate service and feeder conduit runs and equipment in green color. Electrical Installer shall forward drawing files to Communications and Electronic Safety and Security Installer.
6. Communications and Electronic Safety and Security Installer will indicate cable trays and cabling runs and equipment in purple color. Communications and Electronic Safety and Security Installer shall forward completed drawing files to Contractor.
7. Contractor shall perform the final coordination review. As each coordination drawing is completed, Contractor will meet with Architect to review and resolve conflicts on the coordination drawings.

D. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:

1. File Preparation Format:

    a. Same digital data software program, version, and operating system as original Drawings.

2. File Submittal Format: Submit or post coordination drawing files using PDF format.

3. Architect 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 Data Software Program: Drawings are available in latest version of Autocad.
    c. Contractor shall execute a data licensing agreement in the form of AIA Document C106.

1.7 REQUEST FOR INFORMATION (RFI)

A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
2. Coordinate and submit RFIs in a prompt manner 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. Owner name.
3. Owner's Project number.
4. Name of Architect.
5. Architect's Project number.
6. Date.
7. Name of Contractor.
8. RFI number, numbered sequentially.
9. RFI subject.
10. Specification Section number and title and related paragraphs, as appropriate.
11. Drawing number and detail references, as appropriate.
12. Field dimensions and conditions, as appropriate.
13. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
14. Contractor's signature.
15. 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: Software-generated form with substantially the same content as indicated above, acceptable to Architect.

1. Attachments shall be electronic files in PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven days for Architect's response for each RFI. RFIs received by Architect 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 by Architectof 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 in writing within 5 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 biweekly. Software log with not less than the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number, including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within three days if Contractor disagrees with response.

1.8 DIGITAL PROJECT MANAGEMENT PROCEDURES

A. Use of Architect's Digital Data Files: Digital data files of Architect's CAD drawings will be provided by Architect for Contractor's use during construction.

1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project Record Drawings.
2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
3. Digital Drawing Software Program: Contract Drawings are available in latest version of Autocad.
4. Contractor shall execute a data licensing agreement in the form of AIA Document C106 Digital Data Licensing Agreement.

    a. Subcontractors and other parties granted access by Contractor to Architect's digital data files shall execute a data licensing agreement in the form of AIA Document C106.
5. The following digital data files will be furnished for each appropriate discipline:

    a. Floor plans.
    b. Reflected ceiling plans.

B. Web-Based Project Management Software Package: Provide, administer, and use web-based Project management software package for purposes of hosting and managing Project communication and documentation until Final Completion.

1. Web-based Project management software includes, at a minimum, the following features:

a. Compilation of Project data, including Contractor, subcontractors, Architect, Architect's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.
c. Document workflow planning, allowing customization of workflow between project entities.
d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, Minor Changes in the Work, Construction Change Directives, and Change Orders.
e. Track status of each Project communication in real time, and log time and date when responses are provided.
f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
g. Processing and tracking of payment applications.
h. Processing and tracking of contract modifications.
i. Creating and distributing meeting minutes.
j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
k. Management of construction progress photographs.
l. Mobile device compatibility, including smartphones and tablets.
m. Procore shall be the required software unless otherwise approved prior to construction.

2. Provide up to fifteen Project management software user licenses for use of Owner, Architect, and Architect's consultants. Provide eight hours of software training at Architect's office for web-based Project software users.
3. At completion of Project, provide digital archive in format that is readable by common desktop software applications in format acceptable to Architect. Provide data in locked format to prevent further changes.

C. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare 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.
3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.9 PROJECT MEETINGS

A. General: 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 a minimum of fourteen days prior to meeting.
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 and Architect, within five days of the meeting.

B. Preconstruction Conference: Architect 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. Attendees: Authorized representatives of Owner Architect, and their consultants; 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.
2. Agenda: Discuss items of significance that could affect progress, including the following:

a. Responsibilities and personnel assignments.
b. Tentative construction schedule.
c. Phasing.
d. Critical work sequencing and long lead items.
e. Designation of key personnel and their duties.
f. Lines of communications.
g. Use of web-based Project software.
h. Procedures for processing field decisions and Change Orders.
i. Procedures for RFIs.
j. Procedures for testing and inspecting.
k. Procedures for processing Applications for Payment.
l. Distribution of the Contract Documents.
m. Submittal procedures.
n. Sustainable design requirements.
o. Preparation of Record Documents.
p. Use of the premises and existing building if applicable.
q. Work restrictions.
r. Working hours.
s. Owner's occupancy requirements.
t. Responsibility for temporary facilities and controls.
u. Procedures for moisture and mold control.
v. Procedures for disruptions and shutdowns.
w. Construction waste management and recycling.
x. Parking availability.
y. Office, work, and storage areas.
z. Equipment deliveries and priorities.
aa. First aid.
bb. Security.
cc. Progress cleaning.

3. 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 when required by other Sections and when required for 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 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: 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, 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. Procedures for completing and archiving web-based Project software site data files.
    d. Submittal of written warranties.
    e. Requirements for preparing operations and maintenance data.
    f. Requirements for delivery of material samples, attic stock, and spare parts.
    g. Requirements for demonstration and training.
    h. Preparation of Contractor's punch list.
    i. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
    j. Submittal procedures.
    k. Coordination of separate contracts.
    l. Owner's partial occupancy requirements.
    m. Installation of Owner's furniture, fixtures, and equipment.
    n. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

E. Progress Meetings: Conduct progress meetings at biweekly intervals.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner 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) Status of submittals.

4) Deliveries.
5) Off-site fabrication.
6) Access.
7) Site use.
8) Temporary facilities and controls.
9) Progress cleaning.
10) Quality and work standards.
11) Status of correction of deficient items.
12) Field observations.
13) Status of RFIs.
14) Status of Proposal Requests.
15) Pending changes.
16) Status of Change Orders.
17) Pending claims and disputes.
18) 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

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. Unusual event reports.

B. Related Requirements:

1. Section 011200 "Multiple Contract Summary" for preparing a combined Contractor's Construction Schedule.
2. Section 014000 "Quality Requirements" for schedule of tests and inspections.
3. Section 012900 "Payment Procedures" for schedule of values and requirements for use of cost-loaded schedule for Applications for Payment.

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. Cost Loading: The allocation of the schedule of values for completing an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum.

C. 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 the critical path of Project and when activities can be performed.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Resource Loading: The allocation of manpower and equipment necessary for completing 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.
2. PDF file.

B. Startup construction schedule.

1. Submittal of cost-loaded startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.

C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals.

E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for each activity, sorted in ascending order by activity number and then by early start date, or actual start date if known.
3. Total Float Report: List of activities sorted in ascending order of total float.
4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.

F. Construction Schedule Updating Reports: Submit with Applications for Payment.

G. Daily Construction Reports: Submit at weekly intervals.

H. Material Location Reports: Submit at monthly intervals.

I. Site Condition Reports: Submit at time of discovery of differing conditions.

J. Unusual Event Reports: Submit at time of unusual event.

1.4 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.

1.5 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

1. Use Microsoft Project, Primavera or Meridian Prolog for current Windows operating system.

2. In-House Option: Owner may waive requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
3. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.

B. 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.

C. Activities: Treat each floor 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 25 days, unless specifically allowed by Architect.
2. Temporary Facilities: Indicate start and completion dates for the following as applicable:

a. Securing of approvals and permits required for performance of the Work.
b. Temporary facilities.
c. Construction of mock-ups, prototypes and samples.
d. Owner interfaces and furnishing of items.

e. Interfaces with Separate Contracts.
f. Regulatory agency approvals.
g. Punch list.

3. Procurement Activities: Include procurement process activities for the following long lead-time 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.

a. Generator and switch gear.
b. Rooftop mechanical equipment.
c. Casework.
d. Door hardware.

4. 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.
5. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
6. Commissioning Time: Include no fewer than 15 days for commissioning.
7. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
8. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and Final Completion.

D. 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.
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. Limitations of continued occupancies.
c. Uninterruptible services.
d. Partial occupancy before Substantial Completion.
e. Use-of-premises restrictions.
f. Provisions for future construction.
g. Seasonal variations.
h. 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. Startup and placement into final use and operation.
m. Commissioning.

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.

E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion, and the following interim milestones:

1. Temporary enclosure and space conditioning.
2. Connection to each permanent utility service and that permanent service connected to the building. (power, water, sewer, gas, cable, telecommunications, etc)
3. Delivery date of major equipment including but not limited to; roof top mechanical units, switchgears, generator, etc.
4. Delivery of major volume bulk items to include; rough-in electrical lighting package, doors/hardware, casework, etc.

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 the Contract Time.

G. 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.

H. 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, equipment required to achieve compliance, and date by which recovery will be accomplished.

I. Distribution: Distribute copies of approved schedule to Architect 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.

1.6 GANTT-CHART SCHEDULE REQUIREMENTS

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.

1. 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.

1.7 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. Testing and inspection.

8. Accidents.
9. Meetings and significant decisions.
10. Unusual events.
11. Stoppages, delays, shortages, and losses.
12. Meter readings and similar recordings.
13. Emergency procedures.
14. Orders and requests of authorities having jurisdiction.
15. Change Orders received and implemented.
16. Construction Change Directives received and implemented.
17. Services connected and disconnected.
18. Equipment or system tests and startups.
19. Partial completions and occupancies.
20. 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.

D. Unusual Event Reports: 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, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

1. Submit unusual event reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

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. Concealed Work photographs.
3. Periodic construction photographs.
4. Final Completion construction photographs.
5. Preconstruction video recordings.
6. Periodic construction video recordings.
7. Construction webcam.

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.
3. Section 024116 "Structure Demolition" for photographic documentation before building demolition operations commence.
4. Section 024119 "Selective Demolition" for photographic documentation before selective demolition operations commence.
5. Section 311000 "Site Clearing" for photographic documentation before site clearing operations commence.

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 and video recording. 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 management software site. Include copy of key plan indicating each photograph's location and direction.
2. Identification: Provide the following information with each image description in web-based Project management software site:

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.

C. Video Recordings: Submit video recordings within seven days of recording.

1. Submit video recordings on CD-ROM or thumb drive. Include copy of key plan indicating each video's location and direction.
2. Identification: With each submittal, provide the following information in file metadata tag:

a. Name of Project.
b. Name and address of photographer.
c. Name of Architect.
d. Name of Contractor.
e. Date video recording was recorded.
f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.

1.3 QUALITY ASSURANCE

A. Photographer Qualifications: An individual who has been regularly engaged as a professional photographer of construction projects for not less than three years.

B. Construction Webcam Service Provider: A firm specializing in providing photographic equipment, web-based software, and related services for construction projects, with a record of providing satisfactory services similar to those required for Project.

1.4 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, and with vibration-reduction technology. Use flash in low light levels or backlit conditions.

B. Digital Video Recordings: Provide high-resolution, digital video in MPEG format, produced by a digital camera with minimum sensor resolution of 12 megapixels and capable of recording in full high-definition mode with vibration-reduction technology. Provide supplemental lighting in low light levels or backlit conditions.

C. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

D. Metadata: Record accurate date and timefrom camera.

E. File Names: Name media files with date Project area and sequential numbering suffix.

1.5 CONSTRUCTION PHOTOGRAPHS

A. Photographer: Engage a qualified photographer to take construction photographs.

B. 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.

C. Preconstruction Photographs: Before commencement of the Work, 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 20 photographs to show existing conditions adjacent to property before starting the Work.
3. Take 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.

D. Concealed Work Photographs: Before proceeding with installing work that will conceal other work, take photographs sufficient in number, with annotated descriptions, to record nature and location of concealed Work, including, but not limited to, the following:

1. Underground utilities.
2. Underslab services.
3. Piping.
4. Electrical conduit.
5. Waterproofing and weather-resistant barriers.

E. Periodic Construction Photographs: Take 20 photographs monthly coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

F. Final Completion Construction Photographs: Take 50 photographs after date of Substantial Completion for submission as Project Record Documents. Architect will inform photographer of desired vantage points.

1.6 CONSTRUCTION VIDEO RECORDINGS

A. Video Recording Photographer: Engage a qualified videographer to record construction video recordings.

B. Narration: Describe scenes on video recording by audio narration by microphone while or dubbing audio narration off-site after video recording is recorded. Include description of items being viewed, recent events, and planned activities. At each change in location, describe vantage point, location, direction (by compass point), and elevation or story of construction.

1. Confirm date and time at beginning and end of recording.
2. Begin each video recording with name of Project, Contractor's name, videographer's name, and Project location.

C. Preconstruction Video Recording: Before starting excavation, record video recording of Project site and surrounding properties from different vantage points, as directed by Architect.

1. Flag construction limits before recording construction video recordings.
2. Show existing conditions adjacent to Project site before starting the Work.
3. Show existing buildings either on or adjoining Project site to accurately record physical conditions at the start of excavation.
4. Show protection efforts by Contractor.

1.7 CONSTRUCTION WEBCAM

A. Webcam: Provide one fixed-location camera(s) with weatherproof housing, mounted to provide unobstructed view of construction site from location approved by Architect, with the following characteristics:

1. Static view.
2. Capable of producing minimum 12 megapixel images.
3. Provide pole mount, power supply, active high-speed data connection to service provider's network, and static public IP address for each camera.

B. Live Streaming Images: Provide web-accessible image of current site image, updated at five-minute intervals when construction is underway.

C. Web-Based Interface: Provide online interface to allow viewing of each high-definition digital still image captured and stored during construction, from the Internet.

1. Access Control: Provide password-protected access for Project team administered by Contractor, providing current image access and archival image access by date and time, with images downloadable to viewer's device.
2. Software: Provide responsive software interface for use on computer, tablet, and mobile screens with accompanying iPhone/iPad app and Android apps.
3. Storage: Maintain images on the website for reference during entire construction period, and for not less than 30 days after Final Completion. Provide sufficient memory on remote server to store all Project images.
4. Online Interface: Provide website interface with Project and client information and logos, calendar-based navigation interface for selecting images, and pan and zoom capability within high-definition images.
5. Forward and Reverse: Provide capability to browse through images, moving forward and backward in time by individual image and by day.
6. Slideshow: Provide capability to automatically display current images from sites when there are three or more cameras used.
7. Time-Lapse: Provide capability for online display of project time-lapse.
8. Dashboard: Provide capability to view thumbnails of all cameras on one screen.
9. Weather: Provide corresponding weather data for each image captured.

D. Maintain cameras and web-based access in good working order, according to web-based construction photographic documentation service provider's written instructions until Final Completion. Provide for service of cameras and related networking devices and software.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013233

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Submittal schedule requirements.
2. Administrative and procedural requirements for submittals.

B. Related Requirements:

1. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
2. Section 013100 "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
3. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
4. Section 013233 "Photographic Documentation" for submitting preconstruction photographs, periodic construction photographs, and Final Completion construction photographs.
5. Section 014000 "Quality Requirements" for submitting test and inspection reports, and schedule of tests and inspections.
6. Section 017700 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
7. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
8. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
9. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect'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 responsive action. Submittals may be rejected for not complying with

requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.4 SUBMITTAL SCHEDULE

A. Submittal Schedule: Submit, as an action submittal, a list 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 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 Schedule: 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 Schedule: Submit concurrently with the first complete submittal of Contractor's construction schedule.

    a. Submit revised submittal schedule as required 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 final release or approval.
    g. Scheduled dates for purchasing.
    h. Scheduled date of fabrication.
    i. Scheduled dates for installation.
    j. Activity or event number.

1.5 SUBMITTAL FORMATS

A. Submittal Information: Include the following information in each submittal:

1. Project name.
2. Date.
3. Name of Architect.
4. Name of Contractor.
5. Name of firm or entity that prepared submittal.
6. Names of subcontractor, manufacturer, and supplier.
7. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier and alphanumeric suffix for resubmittals.
8. Category and type of submittal.

9. Submittal purpose and description.
10. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
11. Drawing number and detail references, as appropriate.
12. Indication of full or partial submittal.
13. Location(s) where product is to be installed, as appropriate.
14. Other necessary identification.
15. Remarks.
16. Signature of transmitter.

B. Options: Identify options requiring selection by Architect.

C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. Electronic Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

E. Submittals Utilizing Web-Based Project Software: Prepare submittals as PDF files or other format indicated by Project management software.

1.6 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Email: Prepare submittals as PDF package and transmit to Architect by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect.

    a. Architect will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.

2. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project management software website. Enter required data in web-based software site to fully identify submittal.

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 submittals for related parts of the Work specified in different Sections, so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Architect reserves 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 Architect'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. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination. Allow 30 days for initial review of doors, frames and hardware.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal.
4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.

    a. Structural.
    b. HVAC.
    c. Plumbing Equipment.
    d. Electrical Equipment & Fixtures.
    e. Elevators.

D. 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 action stamp.

E. 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.

F. 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 action stamp.

1.7 SUBMITTAL REQUIREMENTS

A. 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 unsuitable for use, submit as Shop Drawings, not as Product Data.

2. Mark each copy of each submittal to 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.
    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 that show 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 Shop Drawings, and before or concurrently with Samples.

B. 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.

C. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.

1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
2. Identification: Permanently attach label on unexposed side of Samples that includes the following:

    a. Project name and submittal number.
    b. Generic description of Sample.
    c. Product name and name of manufacturer.
    d. Sample source.
    e. Number and title of applicable Specification Section.
    f. Specification paragraph number and generic name of each item.

3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics and identification information for record.
4. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
5. Paper Transmittal: Include paper transmittal, including complete submittal information indicated.
6. 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.

7. 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. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

8. 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 will retain one 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.

D. 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.

E. 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.

F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

G. Certificates:

1. Certificates and Certifications Submittals: Submit 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. Provide a notarized signature where indicated.
2. 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.
3. 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.
4. Material Certificates: Submit written statements on manufacturer's letterhead, certifying that material complies with requirements in the Contract Documents.
5. Product Certificates: Submit written statements on manufacturer's letterhead, certifying that product complies with requirements in the Contract Documents.
6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of AWS B2.1/B2.1M on AWS forms. Include names of firms and personnel certified.

H. Test and Research Reports:

1. 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 substrate preparation and primers required.
2. 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.
3. 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.
4. 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.
5. 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.

6. 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:

    a. Name of evaluation organization.
    b. Date of evaluation.
    c. Time period when report is in effect.
    d. Product and manufacturers' names.
    e. Description of product.
    f. Test procedures and results.
    g. Limitations of use.

1.8 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 insufficient 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 file and 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.

1.9 CONTRACTOR'S REVIEW

A. Action Submittals 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.

B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp and indication in web-based Project management software. Include 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.

1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.

1.10 ARCHITECT'S REVIEW

A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required, and return.

1. PDF Submittals: Architect will indicate, via markup on each submittal, the appropriate action.

2. Submittals by Web-Based Project Management Software: Architect will indicate, on Project management software website, the appropriate action.

B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect 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.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Architect will return without review submittals received from sources other than Contractor.

F. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspection 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 quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, Commissioning Authority, or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Requirements:

1. Section 012100 "Allowances" for testing and inspection allowances.

1.3 DEFINITIONS

A. Experienced: When used with an entity or individual, "experienced," unless otherwise further described, means having successfully completed a minimum of five 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.

B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

C. 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, assembly, and similar operations.

1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).

D. Mockups: Physical assemblies of portions of the Work constructed to establish the standard by which the Work will be judged. Mockups are not Samples.

1. Mockups are used for one or more of the following:

a. Verify selections made under Sample submittals.
b. Demonstrate aesthetic effects.
c. Demonstrate the qualities of products and workmanship.
d. Demonstrate successful installation of interfaces between components and systems.
e. Perform preconstruction testing to determine system performance.

2. Product Mockups: Mockups that may include multiple products, materials, or systems specified in a single Section.
3. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.

E. 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. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.

F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

G. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source (e.g., plant, mill, factory, or shop).

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. The term "testing laboratory" has the same meaning as the term "testing agency."

I. 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.

J. 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. Contractor's quality-control services do not include contract administration activities performed by Architect.

1.4 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 Statement: 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.

1.5 CONFLICTING REQUIREMENTS

A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Architect regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified is 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.

1.6 INFORMATIONAL SUBMITTALS

A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
2. Primary wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.

B. 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.

C. 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.

D. Reports: Prepare and submit certified written reports and documents as specified.

E. Permits, Licenses, and Certificates: For Owner's record, 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.

1.7 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, telephone number, and email address 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 inspection.
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, telephone number, and email address 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 of 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, telephone number, and email address 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 of whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

1.8 QUALITY ASSURANCE

A. 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. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.

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, applying, 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.

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 is similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities be performed by entities who are recognized experts in those operations. Specialists will satisfy qualification requirements indicated and engage in the activities indicated.

1. Requirements of authorities having jurisdiction supersede requirements for specialists.

G. Testing and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented in accordance with ASTM E329, and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

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, demonstrate, repair, and perform service on installations of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. 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 of size indicated.
2. Build mockups in location indicated or, if not indicated, as directed by Architect.
3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
4. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
5. Demonstrate the proposed range of aesthetic effects and workmanship.
6. Obtain Architect's approval of mockups before starting corresponding Work, fabrication, or construction.

    a. Allow seven days for initial review and each re-review of each mockup.

7. Promptly correct unsatisfactory conditions noted by Architect's preliminary review, to the satisfaction of the Architect, before completion of final mockup.
8. Approval of mockups by the Architect does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
9. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
10. Demolish and remove mockups when directed unless otherwise indicated.

K. Specialty Mockups: See Section 014339 "Mockups" for additional construction requirements for integrated exterior mockups and room mockups.

1.9 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 inspection they are engaged to perform.
2. Payment for these services will be made from testing and inspection allowances specified in Section 012100 "Allowances," as authorized by Change Orders.

3. 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, whether specified or not, to verify and document that the Work complies with requirements.

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. Engage a qualified testing agency to perform quality-control services.

    a. Contractor will 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 inspection 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 inspection 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. 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.

D. Testing Agency Responsibilities: Cooperate with Architect, Commissioning Authority and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect, Commissioning Authority, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the locations 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 duties of Contractor.

E. 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."

F. 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.

G. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives 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 inspection. 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 inspection equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.

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. Coordinate and submit concurrently with Contractor's Construction Schedule. Update and submit with each Application for Payment.

1. Schedule Contents: Include tests, inspections, and quality-control services, including Contractor- and Owner-retained services, commissioning activities, and other Project-required services paid for by other entities.
2. Distribution: Distribute schedule to Owner, Architect, Commissioning Authority, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.10 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
1. Notifying Architect, Commissioning Authority, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
2. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect and Commissioning Authority with copy to Contractor and to authorities having jurisdiction.

3. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
4. Interpreting tests and inspections, and stating in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
5. 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 authorities' having jurisdiction reference during normal working hours.

1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspection, 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 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.
2. Section 011200 "Multiple Contract Summary" for responsibilities for temporary facilities and controls for projects utilizing multiple contracts.
3. Section 012100 "Allowances" for allowance for metered use of temporary utilities.

1.3 USE CHARGES

A. Installation, removal, and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.

B. Sewer Service: Pay sewer-service use charges for sewer usage by all entities for construction operations.

C. Water Service: Pay water-service use charges for water used by all entities for construction operations.

D. Electric Power Service: Pay electric-power-service use charges for electricity used by all entities for construction operations.

E. Natural Gas Service: Pay natural gas-service use charges for natural gas used by all entities for construction operations.

1.4 INFORMATIONAL SUBMITTALS

A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.

B. Implementation and Termination Schedule: Within 15 days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.

C. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.

D. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

E. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold. Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.

1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and requirements for replacing water-damaged Work.
2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
3. Indicate methods to be used to avoid trapping water in finished work.

F. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:

1. Locations of dust-control partitions at each phase of work.
2. HVAC system isolation schematic drawing.
3. Location of proposed air-filtration system discharge.
4. Waste-handling procedures.
5. Other dust-control measures.

1.5 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts.

B. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide concrete or galvanized-steel bases for supporting posts.

C. Fencing Windscreen Privacy Screen: Polyester fabric scrim with grommets for attachment to chain-link fence, sized to height of fence, in color selected by Architect from manufacturer's standard colors.

D. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil (0.25-mm) minimum thickness, with flame-spread rating of 15 or less in accordance with ASTM E84 and passing NFPA 701 Test Method 2.

E. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats, minimum 36 by 60 inches (914 by 1524 mm).

F. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

A. Field Offices: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents, including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one

receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- (1.2-m-) square tack and marker boards.
3. Drinking water and private toilet.
4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).
5. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating, Cooling, and Dehumidifying Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 017700 "Closeout Procedures."

C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

C. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed.

a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
b. Maintain negative air pressure within work area, using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

3.3 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, safety shower and eyewash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

1. Use of Permanent Toilets: Use of Owner's existing or new toilet facilities is not permitted.

E. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.

F. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service underground unless otherwise indicated.

G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

H. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install WiFi cell phone access equipment and one land-based telephone line(s) for each field office.

1. Provide additional telephone lines for the following:

2. At each telephone, post a list of important telephone numbers.

a. Police and fire departments.
b. Ambulance service.
c. Contractor's home office.
d. Contractor's emergency after-hours telephone number.
e. Architect's office.
f. Engineers' offices.
g. Owner's office.
h. Principal subcontractors' field and home offices.

I. Electronic Communication Service: Provide secure WiFi wireless connection to internet with provisions for access by Architect and Owner.

3.4 SUPPORT FACILITIES INSTALLATION

A. Comply with the following:

1. Provide construction for temporary field offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible in accordance with ASTM E136. Comply with NFPA 241.
2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial

Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.

1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

C. Temporary Use of Planned Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Prepare subgrade and install subbase and base for temporary roads and paved areas in accordance with Section 312000 "Earth Moving."
3. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course in accordance with Section 321216 "Asphalt Paving."

D. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain, including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

E. Parking: Provide temporary offsite parking areas for construction personnel.

F. Storage and Staging: Use designated areas of Project site for storage and staging needs.

G. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

H. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification signs as indicated on Drawings.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

a. Provide temporary, directional signs for construction personnel and visitors.

3. Maintain and touch up signs, so they are legible at all times.

I. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."

J. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

K. Temporary Elevator Use: See Division 14 elevator Section for temporary use of new elevators.

L. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

M. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 011000 "Summary."

C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings, requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
4. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

E. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

F. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals, so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.

G. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
2. Maintain security by limiting number of keys and restricting distribution to authorized personnel.

H. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.

I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

J. Temporary Egress: Provide temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction. Provide signage directing occupants to temporary egress.

K. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

L. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner and tenants from fumes and noise.

1. Construct dustproof partitions with gypsum wallboard, with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.

2. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
3. Insulate partitions to control noise transmission to occupied areas.
4. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.

5. Protect air-handling equipment.
6. Provide walk-off mats at each entrance through temporary partition.

M. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition in accordance with requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign, stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.6 MOISTURE AND MOLD CONTROL

A. Moisture and Mold Protection: Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan.

B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard and replace stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.

D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.

2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

    a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 24 hours are considered defective and require replacing.
    b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
    c. Remove and replace materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.7 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

SECTION 015800
PROJECT IDENTIFICATION & SIGN

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project Identification Sign.

B. Project Informational Signs.

C. Prohibited Signs.

D. Maintenance.

E. Removal.

1.02 RELATED SECTIONS

A. Summary of Work.

B. Construction Facilities and Temporary Controls: field offices and sheds.

1.03 QUALITY ASSURANCE

A. Construct sign/structure to withstand applicable loads and conforming to appropriate governmental regulations.

B. Sign Painter: experienced as a professional sign painter for minimum 5 continuous years.

C. Finishes, Painting: adequate to withstand weathering, fading, and chipping for duration of construction.

1.04 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section.

B. Show content, layout, lettering, colors, foundation, structure, sizes, lighting, etc., as required to comply with local temporary sign ordinances.

PART 2 PRODUCTS

2.01 SIGN MATERIALS

A. Structure and Framing: pressure treated wood, structurally adequate.

B. Sign Surfaces: exterior grade plywood with medium density overlay, minimum ¾ thick, standard large sizes to minimize joints.

C. Rough Hardware: galvanized.

D. Paint and Primers: exterior quality, two coats.

E. Lettering: exterior quality paint, contrasting colors as indicated.

PART 3 EXECUTION

3.01 INSTALLATION

A. Obtain permit to erect temporary sign prior to painting.

B. Install project identification sign within 30 days once Owner-Contractor Agreement date fixed.

C. Erect at location of high public visibility adjacent to main entrance to site and as agreed to by Owner and any regulatory agencies.

D. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.

E. Install sign surface plumb and level, with butt joints. Anchor securely.

F. Paint exposed surfaces of sign, supports, and framing.

3.02 PROJECT IDENTIFICATION SIGN

A. As indicated in the Construction Documents.

3.03 PROJECT INFORMATIONAL SIGNS

A. Provide informational signs as required by Architect or the Authority Having Jurisdiction.

B. Paint informational signs of same colors and lettering as Project Identification sign or standard products; size lettering to provide legibility at 100 foot distance.

C. Provide directional signs to direct traffic into and within site. Relocate as Work progress requires.

3.04 PROHIBITED SIGNS

A. All other signs, placards or banners are prohibited and shall not be placed or erected on the site.

3.05 MAINTENANCE

A. Maintain signs and supports clean. Repair deterioration and damage.

3.06 REMOVAL

A. Remove signs, framing, supports, and foundations at completion of Project and restore the area.

END OF SECTION 015800

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 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 011000 "Summary" for Contractor requirements related to Owner-furnished products.
2. Section 012100 "Allowances" for products selected under an allowance.
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.
6. Section 01770 "Closeout Procedures" for submitting warranties.

1.3 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. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products, unless indicated otherwise.
3. Comparable Product: Product by named manufacturer that is demonstrated and approved through the comparable product submittal process described in Part 2 "Comparable Products" Article, 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 single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model

number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.

1. Evaluation of Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification. Manufacturer's published attributes and characteristics of basis-of-design product also establish salient characteristics of products for purposes of evaluating comparable products.

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; submit a comparable product request or substitution request, if applicable.

D. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:

1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.
2. Data indicating compliance with the requirements specified in Part 2 "Comparable Products" Article.

E. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 013300 "Submittal Procedures."

F. Substitution: Refer to Section 012500 "Substitution Procedures" for definition and limitations on substitutions.

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. Resolution of Compatibility Disputes between Multiple Contractors:

a. Contractors are responsible for providing products and construction methods compatible with products and construction methods of other contractors.
b. If a dispute arises between the multiple contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.

1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.
2. Equipment Nameplates: Provide a permanent nameplate on each item of service- or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:

    a. Name of product and manufacturer.
    b. Model and serial number.
    c. Capacity.
    d. Speed.
    e. Ratings.

3. See individual identification Sections in Divisions 21, 22, 23, and 26 for additional equipment identification requirements.

1.5 COORDINATION

A. Modify or adjust affected work as necessary to integrate work of approved comparable products and approved substitutions.

1.6 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 that products are undamaged and properly protected.

C. Storage:

1. Provide a secure location and enclosure at Project site for storage of materials and equipment.
2. Store products to allow for inspection and measurement of quantity or counting of units.

3. Store materials in a manner that will not endanger Project structure.
4. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation and with adequate protection from wind.
5. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.
8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 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 standard warranty form furnished by individual manufacturer for a particular product and issued in the name of the Owner or endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by manufacturer to Owner.

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 in the Project Manual, 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 meeting 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.
6. Or Equal: For products specified by name and accompanied by the term "or equal," "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

    a. Submit additional documentation required by Architect in order to establish equivalency of proposed products. Unless otherwise indicated, evaluation of "or equal" product status is by the Architect, whose determination is final.

B. Product Selection Procedures:

1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

    a. Sole product may be indicated by the phrase "Subject to compliance with requirements, provide the following."

2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

    a. Sole manufacturer/source may be indicated by the phrase "Subject to compliance with requirements, provide products by the following."

3. Limited List of Products: 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 not be considered unless otherwise indicated.

    a. Limited list of products may be indicated by the phrase "Subject to compliance with requirements, provide one of the following."

4. Non-Limited List of Products: 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.

    a. Non-limited list of products is indicated by the phrase "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following."
    b. Provision of an unnamed product is not considered a substitution, if the product complies with requirements.

5. Limited List of Manufacturers: 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 not be considered unless otherwise indicated.

    a. Limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, provide products by one of the following."

6. Non-Limited List of Manufacturers: 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.

    a. Non-limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following."
    b. Provision of products of an unnamed manufacturer is not considered a substitution, if the product complies with requirements.

7. 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 may additionally 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.

    a. For approval of products by unnamed manufacturers, comply with requirements in Section 012500 "Substitution Procedures" for substitutions for convenience.

C. Visual Matching Specification: Where Specifications require the phrase "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 a 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 of Comparable Products: 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 the following requirements:

1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those of the named basis-of-design product. Significant product qualities include attributes, such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
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.

B. Architect's Action on Comparable Products Submittal: If necessary, Architect will request additional information or documentation for evaluation, as specified in Section 013300 "Submittal Procedures."

1. Form of Approval of Submittal: As specified in Section 013300 "Submittal Procedures."
2. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

C. Submittal Requirements, Two-Step Process: Approval by the Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work, including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner's portion of the Work.
6. Coordination of Owner-installed products.
7. Progress cleaning.
8. Starting and adjusting.
9. Protection of installed construction.
10. Correction of the Work.

B. Related Requirements:
1. Section 013300 "Submittal Procedures" for submitting surveys.
2. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.
3. Section 024119 "Selective Demolition" for demolition and removal of selected portions of the building.
4. Section 078413 "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.2 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For land surveyor.

B. Certified Surveys: Submit two copies signed by land surveyor.

C. Certificates: Submit certificate signed by land surveyor, certifying that location and elevation of improvements comply with requirements.

1.4 CLOSEOUT SUBMITTALS

A. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.5 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Professional Engineer Qualifications: Refer to Section 014000 "Quality Requirements."

C. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, or when encountering the need for cutting and patching of elements whose structural function is not known, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
2. Operational Elements: Do not cut and patch 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. Operational elements include the following:

    a. Primary operational systems and equipment.
    b. Fire separation assemblies.
    c. Air or smoke barriers.
    d. Fire-suppression systems.
    e. Plumbing piping systems.
    f. Mechanical systems piping and ducts.
    g. Control systems.
    h. Communication systems.
    i. Fire-detection and -alarm systems.
    j. Conveying systems.
    k. Electrical wiring systems.
    l. Operating systems of special construction.

3. Other Construction Elements: Do not cut and patch other construction elements or 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. Other construction elements include but are not limited to the following:

    a. Water, moisture, or vapor barriers.
    b. Membranes and flashings.
    c. Exterior curtain-wall construction.
    d. Sprayed fire-resistive material.
    e. Equipment supports.

f. Piping, ductwork, vessels, and equipment.
g. Noise- and vibration-control elements and systems.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction 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.

D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of specified products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials. Use materials that are not considered hazardous.

C. 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 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, gas service piping, and water-service piping; underground electrical services; and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work, including Specification Section number and paragraph, and Drawing sheet number and detail, where applicable.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect in accordance with requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks and existing conditions. If discrepancies are discovered, notify Architect promptly.

B. Engage a land surveyor experienced in laying out the Work, using the following accepted surveying practices:

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

D. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.

1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb, and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
4. Maintain minimum headroom clearance of 96 inches (2440 mm) in occupied spaces and 90 inches (2300 mm) in unoccupied spaces, unless otherwise indicated on Drawings.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure satisfactory results as judged by Architect. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations, so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy of type expected for Project.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on-site and placement in permanent locations.

F. Tools and Equipment: Select tools or equipment that minimize production of excessive noise levels.

G. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions with manufacturer.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. 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.

I. Joints: Make joints of uniform width. Where joint locations in exposed Work are not indicated, arrange joints for the best visual effect, as judged by Architect. Fit exposed connections together to form hairline joints.

3.6 CUTTING AND PATCHING

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

C. Temporary Support: Provide temporary support of Work to be cut.

D. Protection: Protect in-place 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.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements in Section 011000 "Summary."

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

G. Cutting: Cut in-place 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 neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and 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 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.

H. 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 practicable, as judged by Architect. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical 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.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

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 in-place 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, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch, corner to corner of wall and edge to edge of ceiling. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place 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 and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 COORDINATION OF OWNER'S PORTION OF THE WORK

A. Site Access: Provide access to Project site for Owner's construction personnel and Owner's separate contractors.

1. Provide temporary facilities required for Owner-furnished, Contractor-installed and Owner-furnished, Owner-installed products.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel and Owner's separate contractors.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
2. Preinstallation Conferences: Include Owner's construction personnel and Owner's separate contractors at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

A. Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

    a. Use containers intended for holding waste materials of type to be stored.

4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls." Section 017419 "Construction Waste Management and Disposal."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 019113 "General Commissioning Requirements."

B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

E. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.

C. Comply with manufacturer's written instructions for temperature and relative humidity.

3.11 CORRECTION OF THE WORK

A. Repair or remove and replace damaged, defective, or nonconforming Work. Restore damaged substrates and finishes.

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.

C. Restore permanent facilities used during construction to their specified condition.

D. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

E. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

F. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 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.

B. Related Requirements:

1. Section 012900 "Payment Procedures" for requirements for Applications for Payment for Substantial Completion and Final Completion.
2. Section 013233 "Photographic Documentation" for submitting Final Completion construction photographic documentation.
3. Section 017823 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
4. Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
5. Section 017900 "Demonstration and Training" for requirements to train the Owner's maintenance personnel to adjust, operate, and maintain products, equipment, and systems.

1.3 DEFINITIONS

A. List of Incomplete Items: Contractor-prepared list of items to be completed or corrected, prepared for the Architect's use prior to Architect's inspection, to determine if the Work is substantially complete.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of cleaning agent.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.5 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest-control inspection.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items required by other Sections.

1.7 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 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.

    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 and Owner's signature for receipt of submittals.

5. Submit testing, adjusting, and balancing 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 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 utility services.
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.
10. Touch up paint 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 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect 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. 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.

1.8 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 in accordance with 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.
5. Submit Final Completion photographic documentation.

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 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. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.9 LIST OF INCOMPLETE ITEMS

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.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor, listed by room or space number.
2. Organize items applying to each space by major element, including categories for ceilings, 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 Contractor.
    e. Page number.

4. Submit list of incomplete items in the following format:
    a. PDF Electronic File: Architect will return annotated file.

1.10 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

C. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

1. Submit on digital media acceptable to Architect.

D. Warranties in Paper Form:

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.

2. 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.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

E. Provide additional copies of each warranty to include in operation and maintenance manuals.

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 of rubbish, waste material, litter, and other foreign substances.
    b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    c. Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.
    d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    e. Remove snow and ice to provide safe access to building.
    f. Clean exposed exterior and interior hard-surfaced 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.
    g. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.

h. Clean flooring, removing debris, dirt, and staining; clean according to manufacturer's recommendations.
i. Vacuum and mop concrete.
j. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
k. 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.
l. Remove labels that are not permanent.
m. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
o. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
p. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.

1) Clean HVAC system in compliance with NADCA ACR. Provide written report on completion of cleaning.

q. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
r. Clean strainers.
s. 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." Section 017419 "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations required by Section 017300 "Execution" before requesting inspection for determination of Substantial Completion.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory manuals.
2. Emergency manuals.
3. Systems and equipment operation manuals.
4. Systems and equipment maintenance manuals.
5. Product maintenance manuals.

B. Related Requirements:

1. Section 011200 "Multiple Contract Summary" for coordinating operation and maintenance manuals covering the Work of multiple contracts.
2. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
3. Section 019113 "General Commissioning Requirements" for verification and compilation of data into operation and maintenance manuals.

1.3 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.

1.4 CLOSEOUT SUBMITTALS

A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect will comment on whether content of operation and maintenance submittals is acceptable.

2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operation and maintenance manuals in the following format:

1. Submit on digital media acceptable to Architect. Enable reviewer comments on draft submittals.
2. Submit one paper copy.

C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.

D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.

1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

E. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

1.5 FORMAT OF OPERATION AND MAINTENANCE MANUALS

A. 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: Bookmark 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.

B. Manuals, Paper Copy: Submit manuals in the form of hard-copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) 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. Enclose title pages and directories in clear plastic sleeves.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch (215-by-280-mm) 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.

1.6 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization of Manuals: 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.

B. 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.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect.
8. Name and contact information for Commissioning Authority.
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.

C. 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.

D. 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.

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."

1.7 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals. List items and their location to facilitate ready access to desired information. Include the following:

1. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
2. 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.
3. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

1.8 EMERGENCY MANUALS

A. 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.

B. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

C. 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. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.

8. Chemical release or spill.

D. 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.

E. 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.

1.9 SYSTEMS AND EQUIPMENT OPERATION MANUALS

A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.

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.

B. 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.

C. 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.

D. 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.

E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

F. Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

1.10 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.

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.

B. 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 warranties and bonds as described below.

C. 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.

D. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins; 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.

a. 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.

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.

E. 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.

F. 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.

G. 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.

H. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

I. 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.

J. 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 maintenance manuals.

1.11 PRODUCT MAINTENANCE MANUALS

A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B. 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.

C. 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.

D. 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.

E. 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.

F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

G. 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 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 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 011200 "Multiple Contract Summary" for coordinating Project Record Documents covering the Work of multiple contracts.
2. Section 017300 "Execution" for final property survey.
3. Section 017700 "Closeout Procedures" for general closeout procedures.
4. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set(s) of marked-up record prints.

a. Final Submittal:
1) Submit PDF electronic files of scanned Record Prints and one set(s) of file prints.
2) Print each drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and Contract modifications.

C. Record Product Data: Submit annotated PDF electronic files and directories 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.

D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.

1.4 RECORD DRAWINGS

A. Record Prints: Maintain one 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.
    e. Cross-reference record prints to corresponding photographic documentation.

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.
    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 prints 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: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
   1. Format: Annotated PDF electronic file with comment function enabled.
   2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
   3. Refer instances of uncertainty to Architect for resolution.
   4. Architect will furnish Contractor with one set of digital data files of the Contract Drawings for use in recording information.

      a. See Section 013100 "Project Management and Coordination" for requirements related to use of Architect's digital data files.
      b. 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 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 Architect.
      e. Name of Contractor.

1.5 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: Submit record specifications as annotated PDF electronic file and/or scanned PDF electronic file(s) of marked-up paper copy of Specifications.

1.6 RECORD PRODUCT DATA

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. 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, Record Specifications, and Record Drawings where applicable.

C. Format: Submit Record Product Data as annotated PDF electronic file and/or 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.

1.7 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 PDF electronic file and/or scanned PDF electronic file(s) 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.

1.8 MAINTENANCE OF RECORD DOCUMENTS

A. Maintenance of Record Documents: Store Record Documents 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 reference during normal working hours.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Instruction in operation and maintenance of systems, subsystems, and equipment.
2. Demonstration and training video recordings.

B. Allowances: Furnish demonstration and training instruction time under the demonstration and training allowance as specified in Section 012100 "Allowances."

C. Unit Price for Instruction Time: Length of instruction time will be measured by actual time spent performing demonstration and training in required location. No payment will be made for time spent assembling educational materials, setting up, or cleaning up. See requirements in Section 012200 "Unit Prices."

1.3 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 demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

B. Attendance Record: For each training module, submit list of participants and length of instruction time.

C. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 CLOSEOUT SUBMITTALS

A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.

1. Identification: On each copy, provide an applied label with the following information:

    a. Name of Project.
    b. Name and address of videographer.
    c. Name of Architect.
    d. Name of Construction Manager.
    e. Name of Contractor.
    f. Date of video recording.
2. At completion of training, submit complete training manual(s) for Owner's use prepared in same paper and PDF file format required for operation and maintenance manuals specified in Section 017823 "Operation and Maintenance Data."

1.5 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. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.

C. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.

D. Preinstruction 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.

1.6 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 have been reviewed and approved by Architect.

1.7 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. Systems and equipment operation manuals.
c. Systems and equipment maintenance manuals.
d. Product maintenance manuals.
e. Project Record Documents.
f. Identification systems.
g. Warranties and bonds.
h. 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 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.

1.8 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.

1.9 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. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
2. Owner will furnish an instructor to describe Owner's operational philosophy.
3. Owner will furnish Contractor with names and positions of participants.

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 Architect, with at least seven days' advance notice.

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. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.

F. 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.

1.10 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

1. At beginning of each training module, record each chart containing learning objective and lesson outline.

B. Digital Video Recordings: Provide high-resolution, digital video in MPEG format, produced by a digital camera with minimum sensor resolution of 12 megapixels and capable of recording in full HD modewith vibration reduction technology.

1. Submit video recordings on CD-ROM or thumb drive.
2. File Hierarchy: Organize folder structure and file locations according to Project Manual table of contents. Provide complete screen-based menu.
3. File Names: Utilize file names based on name of equipment generally described in video segment, as identified in Project specifications.

4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the equipment demonstration and training recording that describes the following for each Contractor involved on the Project, arranged according to Project Manual table of contents:

    a. Name of Contractor/Installer.
    b. Business address.
    c. Business phone number.
    d. Point of contact.
    e. Email address.

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.

1. Film training session(s) in segments not to exceed 15 minutes.

    a. Produce segments to present a single significant piece of equipment per segment.
    b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
    c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.

D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.

1. Furnish additional portable lighting as required.

E. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.

F. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 017900

SECTION 031100:
CONCRETE FORMING

PART 1 - GENERAL

1.1 SUMMARY

A. The extent of formwork is indicated by the cast-in-place concrete structures shown on the Drawings.

B. The Work includes providing formwork, and shoring, for cast-in-place concrete and installation into formwork of items furnished by others, such as anchor bolts, setting plates, bearing plates, anchorages, inserts, frames, nosings, and other items to be embedded in concrete (but not including reinforcing steel).

1.2 SUBMITTALS

A. Product Data: Manufacturer's data and installation instructions for proprietary materials including form coatings, manufactured form systems, ties, accessories, and other items specified.

B. Concrete Shoring Formwork: Provide shop drawings and calculations signed and sealed by a Professional engineer registered in the State of Florida.

1.3 QUALITY ASSURANCE

A. Examine the substrate and the conditions under which concrete formwork is to be performed. Do not proceed with the work until unsatisfactory conditions have been corrected.

B. Codes and Standards: Unless otherwise shown or specified, design, construct, erect, maintain, and remove forms and related structures for cast-in-place concrete work in compliance with the American Concrete Institute Standard ACI 347, "Recommended Practice for Concrete Formwork."

C. Allowable Tolerances

1. Construct formwork to provide completed cast-in-place concrete surfaces complying with the tolerances specified in ACI 347 and as follows:

    a. Variation from plumb in lines and surfaces of columns, piers, walls, and arrises; 1/4 inch per 10 feet, but not more than one inch. For exposed corner columns, control joint grooves, and other conspicuous lines, 1/4 inch in a bay or 20 feet maximum; 1/2" maximum in 40 ft. or more.

    b. Variation in sizes and locations of sleeves, floor openings, and wall openings, 1/4 inch.

    c. Variations in footings plan dimensions, minus 1/2 inch and plus 2 inches; misplacement or eccentricity, 2 percent of the footing width in direction of misplacement but not more than 2 inches; thickness reduction, minus 5 percent.

2. Before concrete placement, check the lines and levels of erected formwork. Make corrections and adjustments to ensure proper size and locations of concrete members and stability of forming systems.

3. During concrete placement, check formwork and related supports to ensure that forms are not displaced and that completed work will be within specified tolerances.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

A. Forms for Exposed Finish Concrete

1. Unless otherwise shown or specified, construct formwork for exposed concrete surfaces metal, metal-framed plywood-faced, to provide continuous, straight, smooth as-cast surfaces. Furnish in largest practicable sizes to minimize number of joints to conform to joint system shown on Drawings. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection.

    a. Plywood: APA grade-trademarked "B-B Plyform Exterior," mill oiled.

B. Forms for Unexposed Finish Concrete: Form with plywood, lumber, metal, or other acceptable material. Provide lumber that is dressed on at least 2 edges and one side for tight fit.

C. Cylindrical Forms

1. Form round-section members of heavy glass-fiber reinforced plastic or galvanized steel sheets. Butt sections together with bolted or keyed joints. Finish interior joints of forms smooth so there is no visible seam on finished concrete surfaces.
2. Form round-section members with paper or fiber tubes, constructed of laminated plies using water-resistant type adhesive with wax impregnated exterior for weather and moisture protection.

    a. Provide units with sufficient wall thickness to resist loads imposed by wet concrete without deformation.
    b. Provide manufacturer's standard plastic-lined-interior units.

D. Form Units

1. Provide factory-fabricated, adjustable-length, removable, or snap-off metal form ties; design to prevent form deflection and to prevent spalling concrete surfaces upon removal.
2. Unless otherwise shown, provide ties so that portion remaining within concrete after removal of exterior parts is at least one inch from outer concrete surface. Unless otherwise indicated, provide form ties which will leave a hole not larger than one-inch diameter in concrete surfaces.
3. Form ties fabricated on the project site and wire ties are not acceptable.

E. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces and will not impair subsequent treatment of concrete surfaces bond or adhesion, nor impede the wetting of surfaces to be cured with water or curing compounds.

F. Inserts

1. Provide metal inserts for anchorage of materials or equipment to concrete construction not supplied by other trades and as required for the Work.
2. Provide Fry original reglet as manufactured by Fry Reglet Corporation, Alhambra, California. Reglet shall be made of .050 polyvinylchloride, meeting ASTM Spec. D-1874. Provide steel spacer channel for positive alignment and barrier to grout.
3. Vinyl Chamfer Strips: Shall be Vinylex CSN-1/2 as manufactured by Vinylex Corporation, Knoxville, Tennessee.

2.2 DESIGN OF FORMWORK

A. Design, erect, support, brace, and maintain formwork so that it will safely support vertical and lateral loads that might be applied, until such loads can be supported by the concrete structure. Carry vertical and lateral loads to ground by formwork system and in-place construction that has attained adequate strength for that purpose. Construct formwork so that concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork and construction tolerances and surface irregularities complying with the following ACI 347 limits:
   1. Provide Class A tolerances for concrete surfaces exposed to view.
   2. Provide Class C tolerances for other concrete surfaces.

B. Design forms and falsework to include assumed values of live load, dead load, weight of moving equipment operated on formwork, concrete mix, height of concrete drop, vibrator frequency, ambient temperature, foundation pressures, stresses, lateral stability, and other factors pertinent to safety of structure during construction.

C. Design formwork to be readily removable without impact, shock, or damage to cast-in-place concrete surfaces and adjacent materials. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses and the like for easy removal.

D. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joint and provide backup material at joints as required to prevent leakage and fins.

E. Side forms of footings may be omitted and concrete placed directly against excavation only when requested by Contractor and accepted by Architect. When omission of forms is accepted, provide additional concrete beyond the minimum design profiles and dimensions of the footings as detailed.

E. Side forms are not required at the sides of trench footings or other footings where specifically indicated.

F. Provide temporary openings for cleanouts and inspections where interior area of formwork is inaccessible before and during concrete placement. Securely brace temporary openings and set tightly to forms to prevent losing concrete mortar. Locate temporary openings in forms at inconspicuous locations.

G. Chamfer exposed corners and edges indicated using chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

H. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Re-tighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

I. Provisions for other Trades: Coordinate openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.

PART 3 - EXECUTION

3.1 FORM CONSTRUCTION

A. Construct forms to sizes, shapes, and lines, and dimensions shown to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers,

blocking, screeds, bulkheads, anchorages and inserts, and other features required in the Work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent cement paste from leaking.

B. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where the slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and assure ease of removal.

C. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Brace temporary closures and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms in as inconspicuous location as possible, consistent with project requirements.

1. Form intersecting planes to provide true, clean-cut corners, with edge grain of plywood not exposed as form for concrete.

D. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joints and provide backup material at joints as required to prevent leakage and fins.

E. Falsework

1. Erect falsework and support, brace and maintain it to safely support vertical, lateral, and asymmetrical loads applied until such loads can be supported by in-place concrete structures. Construct falsework so that adjustments can be made for take-up and settlement.
2. Provide wedges, jacks, or camber strips to facilitate vertical adjustments. Carefully inspect falsework and formwork during and after concrete placement operations to determine abnormal deflection or signs of failure; make necessary adjustments to produce work or required dimensions.
3. Support form facing materials by members spaced sufficiently close to prevent deflection. Fit forms placed in successive units for continuous surfaces to accurate alignment, free from irregularities and within allowable tolerances.
4. Provide camber in formwork as required for anticipated deflections due to weight and pressures of fresh concrete and construction loads for long span members without intermediate supports.
5. Carefully inspect falsework and formwork during and after concrete placement operations to determine abnormal deflection or signs of failure; make necessary adjustments to produce work of required dimension.

F. Forms for Exposed Concrete

1. Provide form coatings on forms for all exposed finished concrete. Plywood grain indentations or patterns left in the concrete as a result of the forms are not acceptable.
2. Drill forms to suit ties used and to prevent leakage of concrete mortar around tie holes. Do not splinter forms by driving ties through improperly prepared holes.
3. Do not use metal cover plates for patching holes or defects in forms.
4. Provide sharp, clean corners at intersecting planes without visible edges or offsets. Back joints with extra studs or girts to maintain true, square intersections.
5. Use extra studs, whalers, and bracing to prevent bowing of forms between studs and to avoid bowed appearance in concrete. Do not use narrow strips of form material which will produce bow.
6. Assemble forms so they may be readily removed without damage to exposed

concrete surfaces.

7. Form molding shapes, recesses, and projections with smooth-finish materials and install in forms with sealed joints to prevent displacement.

G. Corner Treatment

1. Form chamfers with 3/4-inch x 3/4-inch strips, unless otherwise shown. Extend terminal edges to required limit and miter chamfer strips at changes in direction.
2. Unexposed corners may be formed either square or chamfered.

H. Provision for Other Trades: Provide openings in concrete formwork to accommodate work of other trades including those under separate prime contracts. Size and location of openings, recesses, and chases are the responsibility of the trade requiring such items. Accurately place and securely support items to be built into form.

I. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is to be placed. Retighten forms immediately after concrete placement as required to eliminate mortar leaks.

J. Construction Joints: Where footings and walls are divided by construction joints, joints shall have keyways formed. Keyways shall be 1/3 of the dimension of the element in both directions and shall be at least 2 inches thick.

3.2 FORM COATINGS

A. Coat form contact surfaces with form-coating compound before reinforcement is placed. Do not allow excess form coating material to accumulate in the forms or to come in contact with surfaces which will be bonded to fresh concrete. Apply in compliance with manufacturer's instructions.

B. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

3.3 INSTALLATION OF EMBEDDED ITEMS

A. Set and build into the Work anchorage devices and other embedded items required for other Work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of the items to be attached thereto.

B. Edge Forms and Screed Strips for Slabs: Set edge form or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in the finished slab surface. Provide and secure units to support types of screeds required.

1. Forms for concrete curbs and bases shall be rigidly held straight and tight so that finished concrete will be level and even.

3.4 REMOVAL OF FORMS

A. Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.

B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may not be removed in less than 14 days or until concrete has attained at least 75 percent of design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.

C. Form facing material may be removed 4 days after placement, only if shores and other

vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports.

3.5 REUSE OF FORMS

A. Clean and repair surfaces of forms to be reused in the work. Split, frayed, delaminated, or otherwise damaged form facing material will not be acceptable. Apply new form coating compound material to concrete contact surfaces as specified for new formwork.

B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close all joints. Align and secure joints to avoid offsets. Do not use "patched" forms for exposed concrete surfaces, except as acceptable to the Architect.

END OF SECTION 031100

SECTION 032000:
CONCRETE REINFORCING

PART 1 - GENERAL

1.1 SUMMARY

A. The extent of concrete reinforcement is shown on the Drawings and in schedules.

B. The Work includes fabrication and placement of reinforcement for cast-in-place concrete including bars, welded wire fabric, ties, and supports.

1.2 SUBMITTALS

A. Product Data: Manufacturer's specifications and installation instructions for proprietary materials and reinforcement accessories.

B. Shop Drawings: fabrication, bending, and placement of concrete reinforcement. Comply with the ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures." Show bar schedules, stirrup spacing, diagrams of bent bars, arrangements, and assemblies as required for the fabrication and placement of concrete reinforcement. Show building plans with bar sizes, spacing, and quantities for all bent and straight reinforcing bars.

1.3 QUALITY ASSURANCE

A. Codes and Standards: Comply with requirements of the latest edition of the following codes and standards, except as herein modified:

1. American Welding Society, AWS D 1.4 - "Structural Welding Code - Reinforcing Steel."
2. Concrete Reinforcing Steel Institute, "Manual of Standard Practice."
3. American Concrete Institute, ACI 318 "Building Code Requirements for Structural Concrete."

1.4 DELIVERY, HANDLING, AND STORAGE

A. Deliver reinforcement to the project site bundled, tagged, and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on placement diagrams.

B. Store concrete reinforcement materials at the site to prevent damage and accumulation of dirt or excessive rust.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Reinforcing Bars (ReBar): ASTM A615, and as follows.

1. Provide Grade 60 for all bars unless noted otherwise in Structural Drawings.
2. Provide Grade 75 for bars if specified in Structural Drawings.

B. Steel Wire: ASTM A1064.

C. Welded Wire Fabric (WWF): ASTM A1064, sheets only, no rolled fabric

D. Fibrous Reinforcement: Furnish either nylon or fibrillated polypropylene fibers.

1. Nylon Fibers: 100 percent pure nylon filamentized with a minimum diameter of 23 microns, a length of 3/4 inch, a minimum specific gravity of 1.14 and a minimum tensile strength of 130 ksi. Nylon fibers shall be added to the concrete mix at a rate of one pound per cubic yard.

    a. Subject to compliance with requirements, provide one of the following:

        1) "Nylon": Nycon Inc., Indianapolis, Indiana
        2) "Superiormesh 66": Superior Fiber Products, Mentor, Ohio
        3) "Forta Nylon": Forta Corporation, Grove City, Pennsylvania

2. Polypropylene Fibers: 100 percent collated fibrillated polypropylene fibers with a length of 3/4 inch, a minimum specific gravity of 0.09 and a minimum tensile strength of 80 ksi. Polypropylene fibers shall be added to the concrete mix at a rate of one and one-half pounds per cubic yard.

    a. Subject to compliance with requirements, provide one of the following:

        1) "Fibermix Monofilament M.D.," Fibermesh Company, Chattanooga, Tennessee.
        2) "Forta Econo-Net": Forta Corporation, Grove City, Pennsylvania.

3. Fiber reinforcement shall require Architect's approval for sealed concrete finish locations, for horizontal slab on grade, and toppings over structural elevated slabs only.

E. Supports for Reinforcement (including welded wire fabric): Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement in place.

1. Use wire bar type supports complying with CRSI recommendations, unless otherwise indicated. Do not use wood, brick, and other unacceptable materials.
2. For slabs on grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
3. Over waterproof membranes, use precast concrete chairs to prevent penetration of the membrane
4. For footings, trench footings, and grade beams use precast concrete bricks (f'c = 3000 psi min. at 28 days). (Concrete masonry bricks not acceptable).
5. For concrete masonry bond beams use #2 bar laterally, tied to each longitudinal reinforcing bar below to hold bars apart and up from bottom. Space #2 bars at 48 inches o.c.

F. Grouted Anchor Bolts: Per Structural Drawings

G. Rebar Ties: Nylon or annealed tie wire as recommended by the ACI.

2.2 FABRICATION

A. Fabricate reinforcing bars to conform to required shapes and dimensions, with fabrication tolerances complying with CRSI "Manual of Standard Practice." In case of fabricating errors, do not re-bend or straighten reinforcement in a manner that will injure or weaken the material.

B. Unacceptable Materials: Reinforcement with any of the following defects will not be permitted in the work.

1. Bar lengths, depths, and bends exceeding specified fabrication tolerances.
2. Bends of kinks not indicated on Drawings or final shop drawings.
3. Bars with reduced cross-section due to excessive rusting or other cause.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the conditions under which concrete reinforcement is to be placed. Do not proceed with the Work until unsatisfactory conditions have been corrected.

B. Notify Architect and Inspector when steel placement for a concrete pour is nearing a completion so that the Work may be observed.

3.2 INSTALLATION

A. Comply with the specified codes and standards and Concrete Reinforcing Steel Institute recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports, and as herein specified.

B. Clean reinforcement to remove loose rust and mill scale, earth, and other materials which reduce or destroy bond with concrete.

C. Position, support, and secure reinforcement against displacement by formwork construction, or concrete placement operations. Locate and support reinforcing by precast concrete brick, metal chairs, runners, bolsters, spacers, and hangers as required.

D. Place reinforcement to obtain the minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports together with 16-gauge wire to hold reinforcement accurately in position during concrete placement operations. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.

E. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with 16-gauge wire. Do not make end laps midway between supporting beams or directly over beams of continuous structures. Offset end laps in adjacent widths to prevent continuous laps.

F. Provide sufficient numbers of supports and of strengths to carry reinforcement. Do not place reinforcing bars more than 2 inches beyond the last leg of continuous bar support. Do not use supports as bases for runaways for concrete conveying equipment and similar construction loads.

G. Provide standard reinforcing splices by lapping ends, placing bars in contact, and tightly tying wire. Comply with requirements of ACI 318 for minimum lap of spliced bars.

H. Reinforcing steel installed in continuous footings shall run continuous. This shall include specially shaped components with proper lap where corner reinforcing and step footings occur.

I. Provide additional reinforcing around required openings in footings, and slabs having at least a one-foot dimension.

END OF SECTION 032000

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SECTION 032900:
UNDER-SLAB VAPOR BARRIER/RETARDER

PART 1 – GENERAL

1.1 SUMMARY

A. Products Supplied Under This Section
   1. Vapor Barrier, seam tape, pipe boots, detail strip for installation under concrete slabs.

B. RELATED SECTIONS
   1. Section 033000 Cast-in-place Structural Concrete

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM)
   1. ASTM E 1745-97 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil
      Or Granular Fill under Concrete Slabs
   2. ASTM E 154-88 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs
   3. ASTM E 96-95 Standard Test Methods for Water Vapor Transmission of Materials
   4. ASTM E 1643-98 Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs

B. American Concrete Institute (ACI)
   1. ACI 302.1R-96 Vapor Barrier Component (plastic membrane) is not less than 10 mils thick

1.3 SUBMITTALS

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

PART 2 – PRODUCTS

2.1 MATERIALS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. ISI Building Products.
   b. Poly-America, L.P.
   c. Stego Industries, LLC. (Basis of Design)
   d. W.R. Meadows, Inc.

B. Vapor Barrier (performance based specification)
   1. Vapor Barrier membrane must have the following properties.
      A. Minimum 10-mil thick polyolefin geomembrane
      B. Manufactured from prime virgin resins
      C. Water Vapor Barrier: ASTM E-1745 (meets or exceeds Class A)
      D. Permeance Rating: ASTM F1249 0.03 (gr./ft^2/hr. or lower)
      E. Puncture Resistance: ASTM D1709 minimum 3,000 grams
      F. Tensile Strength: ASTM D882 minimum 50.0 lbf/in

2.2 ACCESSORIES

A. Seam Tape
   1. High Density Polyethylene Tape with pressure sensitive adhesive. Minimum width 4 inches.

B. Pipe Boots
   2. Construct pipe boots from vapor barrier material and pressure sensitive tape per manufacturer's instructions.

PART 3 – EXECUTION

3.1 PREPARATION

A. Ensure that subsoil is approved by architect
   1. Level and tamp or roll aggregate, sand or tamped earth base.

3.2 INSTALLATION

A. Install Vapor Barrier:
   1. Installation shall be in accordance with manufacturer's instructions and ASTM E 1643–98.

      A. Unroll Vapor Barrier with longest dimension parallel with the direction of the pour.
      B. Lap Vapor Barrier below footings and seal to foundation walls.
      C. Overlap joints 6 inches and seal with manufacturer's tape.
      D. Seal all penetrations (including pipes) with manufacturer's pipe boot.
      E. No penetration of the vapor barrier is allowed except for reinforcing steel and permanent utilities.
      F. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged area 6 inches and taping all four sides with tape.

END OF SECTION 032900

SECTION 033000:
CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes interior and exterior cast-in-place concrete, mix design, placement procedures, and finishes. Work includes, but is not necessarily limited to:
   1. Exterior Concrete:
      a. Walks, curbs, ramps, steps, and stoops
      b. Tactile warning texture Equipment pads and bases
   2. Interior Concrete:
      a. Floor Slabs: On grade and elevated
      b. Bases, curbs, risers, and steps
      c. Footings, pads, piers, columns, beams, walls
      d. Recesses for floor finishes requiring same
   3. Other Materials
      a. Concrete admixtures
      b. Waterstops
      c. Expansion joint fillers
      d. Curing materials
      e. Self-leveling underlayment
      f. Bonding agent

B. Provide other cast-in-place concrete and related work as shown on the Drawings and specified herein for complete and finished work, except concrete work specifically designated to be provided under the Work of other Sections of these Specifications.

C. The following is by other Sections, meeting the requirements of this Section (unless indicated otherwise).
   1. Posts for chain link fencing
   2. Bases for exterior equipment
   3. Encasement of underground utilities or connections
   4. Specifically excluded items
   5. Flagpole base

1.2 SUBMITTALS

A. Product Data: Proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, dry-shake finish materials, and other specified items.
   1. Include concrete curing materials product data and specification sheets

B. Samples: Include names, sources, and descriptions, as follows:
   1. Normal weight aggregates
   2. Fiber reinforcement.
   3. Reglets.
   4. Waterstops.

C. Laboratory test reports for concrete materials and mix design tests.
D. Material certificates in lieu of material laboratory test reports when permitted by Architect. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.
E. Minutes of pre-installation conference.
F. Proposed mix designs.
G. Statement from ready-mixed plant verifying conformance to specifications and proposed mix designs.
H. Written approval/certification of concrete curing materials as specified herein.
I. ISO 9001/9002 Registration Certificate for companies that are ISO registered.

1.3 QUALITY ASSURANCE

A. Refer to Division 1 for additional requirements.
B. Standards: Comply with the provisions of the following in accordance with the Florida Building Code 8th Edition (2023), except as otherwise shown or specified.
   1. ACI 117 "Standard Tolerances for Concrete Construction and Materials"
   2. ACI 211.1 "Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete"
   3. ACI 301 "Specifications for Structural Concrete for Buildings"
   4. ACI 302.1R "Guide for Concrete Floor and Slab Construction"
   5. ACI 304R "Guide for Measuring, Mixing, Transporting, and Placing Concrete"
   6. ACI 311.4R "Guide for Concrete Inspection"
   7. ACI 318-08 "Building Code Requirements for Reinforced Concrete and Commentary"
   8. Concrete Reinforcing Steel Institute, "Manual of Standard Practice"
   9. Comply with building code requirements which are more stringent than the above.
   10. ACI 305 - “Hot Weather Concreting”
   11. ACI 306 - “Cold Weather Concreting”
C. Materials may require testing and re-testing, as directed by the Architect, at any time during the progress of the Work. Allow free access to material stockpiles and facilities. Tests shall be done at the Contractor's expense.
D. Concrete curing materials shall be approved by the manufacturer of the product for the final finish material on the concrete slabs. Submit written approval/certification if requested by the Architect.
E. Material manufacturers shall be ISO 9001/9002 registered or provide proof of documented quality assurance system. Quality system must be registered by an independent registrar who is accredited by the American National Standards Institute (ANSI-RAB) or by another internationally recognized body. ISO 9001/9002 certification or proof of documented quality assurance system shall be included with the material submittals.

1.4 PROJECT CONDITIONS

A. Coordinate installation of inserts and sleeves for other trades. Time delivery so as note to cause delay in the progress of this Work.

B. Installation requirements within this Section are not intended to be restrictive and the Contractor is allowed, when reviewed with the Architect's field representative, to adjust

the means and methods used to meet required tolerances. Compliance with required tolerances is the responsibility of the Contractor and adjustment required to meet these shall not be unduly restricted by the Architect or his representative.

1.5 FIELD QUALITY CONTROL

A. Floor Tolerance Measurements: Floor flatness and levelness tests on floor slabs shall be conducted in accordance with the provisions set forth in ASTM E 1155-96 (Reapproved 2001), with the exception of Subparagraphs 7.2.3 and 7.3.2 which may be waived at the Owner's option, also Zi calculation to be used shall be N min. = A/10. Floor tolerance measurements shall be made by the independent testing laboratory within 24 hours after completion of the final troweling operation, and before forms and shores have been removed, measurement shall be taken using a Dipstick Auto-Read Floor Profiler as manufactured by The Edward W. Face Company, Inc. of Norfolk, VA. Results of floor tolerance tests, including a formal notice of acceptance or rejection of the work, shall be provided to the Contractor within 24 hours after data collection.

B. Remedy for Out-of-Tolerance Work: Slab sections measuring at or above both of the specified minimum local F-numbers shall be accepted for tolerance compliance as constructed. Floor slab sections measuring below either (or both) of the specified minimum local F-numbers shall be removed and replaced (in the case of slabs-on-grade), or ground or re-topped (in the case of elevated slabs). No remedies for sub-minimum local F-number sections other than replacement of slabs-on-grade, and grinding or re-topping of elevated slabs will be permitted. For the purposes of this paragraph, a floor section shall be a rectangular area bound by column or half-column lines (i.e., minimum sections area - approximately 100 sq. ft.).

C. Special Conditions (Exceptions): Where room sizes (areas receiving concrete flooring) are restricted to smaller areas due to bearing walls or existing construction making finishing difficult, the Architect's Field Representative will determine acceptable deviations/exceptions in testing requirements.

1. Architect's Field Representative may at his discretion:

    a. Waive entirely testing of small rooms, storage areas, and similar spaces.
    b. Reduce the number and select the location of tests.
    c. Waive penalties between specified and minimum locals.
    d. Require that tolerances exceed minimum locals only.
    e. Waive the requirement for removal of concrete not meeting minimum locals if, in his opinion, repairs can bring floors into acceptable/serviceable tolerances.

1.6 CONCRETE TESTING

A. Cooperate and coordinate with the testing laboratory to perform field quality control testing during concrete work under Division 3 in accordance with the current FBC. Refer to the general notes on the structural drawings.

B. Quality Control Testing During Construction: Perform sampling and testing for field quality control during the placement of concrete, as follows:

1. Sampling Fresh Concrete: ASTM C172, except modified for slump to comply with ASTM C94.
2. Slump: ASTM C143, one test for each concrete load at point of discharge, and one for each set of compressive strength test specimens.
3. Concrete Temperature: Test hourly when air temperature is 40 degrees F. and below and when 80 degrees F. and above; and each time a set of compressive test

specimens is made.

4. Compression Test Specimens: ASTM C31
5. Compressive Strength Tests: ASTM C39. Make 5 (4x8 cylinders) laboratory cured specimens. One specimen shall be broken at 7 days and three specimens shall be broken at 28 days, and one retained in reserve for later testing if required.

a. One set for each 100 cubic yards or fraction thereof, of each mix design placed in a day, or for each 5,000 sq. ft. of surface area for slab on grade.
b. One set for each 50 cubic yards or fraction thereof, or each mix design placed in a day, or for each 2500 sq. ft. of surface area for elevated slabs (formed or on metal deck) or walls.

C. Report test results in writing to the Architect, Contractor, and ready-mix supplier on the same day that tests are made. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of Contractor, name of concrete supplier and truck number, name of concrete testing service, concrete type and class, location of concrete batch in the structure (specific locations required), design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength and type and amount of fibrous reinforcement, compressive breaking strength, and type of break for both 7 day tests and 28 day tests.

D. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate the specified concrete strengths and other characteristics have not been attained in the structure, as directed by the Architect. The testing service shall conduct tests to determine the strength and other characteristics of the in-place concrete by compression tests on cored cylinders complying with ASTM C42 or by load testing specified in ACI 318 or other acceptable nondestructive testing methods, as directed. The Contractor shall pay for such tests conducted and other additional testing as may be required, when unacceptable concrete is verified.

E. Evaluation of Quality Control Tests: Do not use concrete delivered to the final point of placement which has slump or total air content outside the specified values.

1. Compressive strength tests for laboratory-cured cylinders will be considered satisfactory if the averages of all sets of 3 consecutive compressive strength tests results equal or exceed the 28-day design compressive strength of the type or class of concrete; and no individual strength test (average of two cylinders) falls below the required compressive strength by more than 500 psi when f'c is 5000 psi or less; or by more than 0.10f'c when f'c is more than 5000 psi.
2. Strength tests of specimens cured under field conditions may be required by the Architect to check the adequacy of curing and protecting of the concrete placed. Specimens shall be molded by the field quality control laboratory at the same time and from the same samples as the laboratory cured specimens.

    a. Provide improved means and procedures for protecting concrete when the 28-day compressive strength of field cured cylinders is less than 85 percent of companion laboratory cured cylinders.
    b. When laboratory cured cylinder strengths are appreciably higher than the minimum required compressive strength, field cured cylinder strengths need not exceed the minimum required compressive strength by more than 500 psi even though the 85 percent criterion is not met.
    c. If individual tests of laboratory cured specimen produce strengths more than 500 psi below the required minimum compressive strength or if

tests of field cured cylinders indicate deficiencies in protection and curing, provide additional measures to assure that the load-bearing capacity of the structure is not jeopardized. If the likelihood of low-strength concrete is confirmed and computations indicate the load-bearing capacity may have been significantly reduced, tests of cores drilled from the area in question may be required.

3. If the compressive strength tests fail to meet the minimum requirements specified, the concrete represented by such tests will be considered deficient in strength.

F. Deficient concrete shall be removed as directed by the Architect and replaced by the Contractor without additional cost to the Owner.

1.7 CONCRETE MATERIALS AND MIX DESIGN

A. Concrete Materials and Mix Design:
   1. Ready-mixed concrete shall be mixed and delivered in accordance with ASTM C94.
   2. Product Data: Submit 2 copies of manufacturer's specifications with application and installation instructions for proprietary materials and items, including admixtures, bonding agents, waterstops, joint systems, chemical floor hardeners, and dry shake finish materials.
   3. Laboratory Test Reports: Submit 2 copies of laboratory test reports for concrete materials and mix design tests. The Architect's review will be for general information only. Production of concrete to comply with specified requirements is the Contractor's responsibility.

B. Tests for Concrete Materials
   1. Normal Weight Concrete: Test aggregates by the methods of sampling and testing of ASTM C33.
   2. Portland Cement: Sample cement and determine the properties by the methods of test ASTM C33.
   3. Submit written reports for each material sampled and tested, prior to the start of Work. Provide the project identification name and number, date of report, name of Contractor, name of concrete testing service, source of concrete aggregates material manufacturer and brand name for manufactured materials, values specified in the referenced specification for each material, and test results. Indicate whether or not material is acceptable for intended use.

C. Submit signed statement form ready-mix plant that concrete furnished for the Project will exactly conform to the approved design mixes.

1.8 PREINSTALLATION CONFERENCE

A. At least 35 days prior to the start of the concrete construction schedule, conduct a preinstallation conference at the project site to review the proposed mix designs and to discuss the required methods and procedures to achieve the required concrete construction.

B. Require representatives of every party who is concerned with the concrete work to attend the conference, including, but not limited to, the following:
   1. Contractor’s superintendent.
   2. Testing laboratory.
   3. Concrete subcontractor.
   4. Ready-mix concrete producer.
   5. Admixture manufacturer(s).

6. Owner.
7. Architect.
8. Structural Engineer.
9. Special Inspector.

C. Meeting Minutes: Record, type and distribute within three (3) days of the meeting.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I.
   1. Use one brand of cement throughout Project.

B. Fly Ash: ASTM C 618, Type F, may be substituted for up to 25 percent of the portland cement in all concrete mixes unless noted otherwise.

C. Normal-Weight Aggregates: ASTM C 33 and as specified. Provide aggregates from a single source for exposed concrete.
   1. For exposed exterior surfaces, do not use fine or coarse aggregates that contain substances that cause spalling.
   2. Local aggregates not complying with ASTM C 33 that have been shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to Architect.
   3. Fine Aggregate: Clean, sharp, natural sand free from loam, clay lumps, or other deleterious substances.
   4. Coarse Aggregate: Clean, un-coated, processed aggregate containing no clay, mud, loam, or foreign matter, as follows:
      a. Crushed stone, processed from natural rock or stone.
      b. Washed gravel, either natural or crushed. Use of pit or bankrun gravels not permitted.
      c. Maximum Aggregate Size: Not larger than one-fifth of narrowest dimension between sides of forms, one-third of depth of slabs, nor three-fourths of minimum clear spacing between individual reinforcing bars or bundles of bars.
   5. Aggregate Supply: Provide aggregates from one source of supply to ensure uniformity in color, size, and shape.

D. Water: Potable.

2.2 CONCRETE ADMIXTURES

A. Provide admixtures produced by established reputable manufacturers and use in compliance with manufacturer's printed directions. Do not use admixtures which have not been incorporated and tested in accepted mixes, unless otherwise authorized specifically in writing by Architect.
   1. Air-Entraining Admixture: ANSI/ASTM C260
   2. Water-Reducing Admixture: ANSI/ASTM C494, Type A.
   3. Set-Control Admixture: ANSI/ASTM C494
   4. Super Plasticizer: ANSI/ASTM C494, Type F.

B. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
   1. Subject to compliance with requirements, provide one of the following:
      a. “AEA-92 and Air Mix 200”, Euclid Chemical Co.

b. "MB-VR or MB-AE", Master Builders, Inc.
c. "Sika AER", Sika Corp.

2. Air-Entraining admixtures shall not be used in slab mixes, on-grade or elevated.

C. Water-Reducing Admixture: ASTM C 494, Type A, and containing not more than 0.05 percent chloride ions.
1. Subject to compliance with requirements, provide one of the following:

a. "Eucon WR-75 or Eucon WR-91", Euclid Chemical Co.
b. "Pozzolith Normal", Master Builders, Inc.
c. "Plastocrete 160", Sika Corp.

D. High-Range Water-Reducing Admixture (Superplasticizer): ASTM C 494, Type F or Type G and containing not more than 0.05 percent chloride ions.
1. Subject to compliance with requirements, provide one of the following:

a. "Eucon 37", Euclid Chemical Co.
b. "Rheobuild 1000", Master Builders, Inc.
c. "Sikament 300", Sika Corp.

E. Water-Reducing, Accelerating Admixture: Non-chloride, non-corrosive per ASTM C 494, Type C or E, and not contain more chloride ions than are present in municipal drinking water. The admixture manufacturer must have long-term non-corrosive test data from and independent testing laboratory (of at least a year's duration) using an acceptable accelerated corrosion test method such as that using electrical potential measures.
1. Subject to compliance with requirements, provide one of the following:

a. "Accelguard 80", Euclid Chemical Co.
b. "Pozzutec 20", Master Builders, Inc.

F. Water-Reducing, Retarding Admixture: ASTM C 494, Type D and contain not more than 0.05 percent chloride ions.
1. Subject to compliance with requirements, provide one of the following:

a. "Eucon Retarder 75", Euclid Chemical Co.
b. "Pozzolith Retarder", Master Builders, Inc.
c. "Plastiment", Sika Corporation.

G. Shrinkage Compensating Cement: ASTM C845, Type K, M, or S.
1. Contractor may substitute shrinkage compensating cement concrete for slabs, on grade or elevated, and eliminate all control joints. Design mixes shall be submitted for approval.

H. Certification: Written conformance to the above-mentioned requirements and the chloride ion content of admixtures will be required from the admixture manufacturer prior to mix design review by the Architect.

I. Prohibited Admixtures: Calcium chloride or admixtures containing more than 0.05 percent chloride ions are not permitted.

2.3 PROPORTIONING AND DESIGN MIXES

A. Proportion mixes by either laboratory trial batch or field experience methods as specified in ACI 301, using materials to be employed on the project for each class of concrete required.

B. Submit written reports to Architect of each proposed mix for each type of concrete at least 35 days prior to start of Work. Indicate with each mix design the items or structures for which it is to be used. Do not begin concrete production until mixes have been

reviewed by Architect. Submit the following information:

1. Complete identification of aggregate source of supply.
2. Tests of aggregate for compliance with specified requirements.
3. Scale weight of each aggregate.
4. Absorbed water in each aggregate.
5. Brand, type, and composition of cement.
6. Brand, type, and amount of each mixture.
7. Amounts of water used in trial mixes.
8. Proportions of each material per cu. yd. including fibrous secondary reinforcement.
9. Gross weight and yield per cu. yd. of trial mixtures.
10. Measured slump.
11. Measured air content.
12. Compressive strength developed at 7 days and 28 days, from not less than 3 test cylinders cast for each 7- and 28-day test, and for each design mix. These test reports may be from previous projects within the past 6 months.
13. Identification number or name of mix to verify agreement with compression test reports.

C. Water-Cement Ratio Methods: Concrete proportions may be established by use of Water-Cement Ratio Limits Table 5.4 and limiting restrictions in ACI 301.

D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, at no additional cost to Owner and as accepted by Architect. Laboratory test data for revised mix designs and strength results must be submitted to and accepted by Architect before using in work.

E. Maximum Water Cement Ratio: Concrete mixes shall be limited to those shown on the contract documents. Mixes shall comply with chapters 3, 4 and 5 of ACI 318 latest building code adopted edition.

F. Super plasticizers, flyash, and water reducers shall be used to obtain required slump while maintaining maximum water-cement ratio.

G. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:

1. Ramps, slabs, and sloping surfaces: Not more than 3 inches
2. Reinforced foundation systems: 4 inches, +/- 1 inch
3. Concrete containing high-range water-reducing admixture (superplasticizer): Not more than 8 inches after adding admixture to site-verified 2-to-3-inch slump concrete.
4. Other concrete: Per Structural Drawings

H. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. For the trial batch method, use an independent testing agency acceptable to the Architect for preparing and reporting proposed mix designs. Trial batch and field experience tests shall have been performed within 12 months of submittal date.

2.4 RELATED MATERIALS

A. Waterstops:

1. Manufacturers: Subject to compliance with requirements, provide products of one of the following:

    a. Progress Unlimited.

b. Williams Products, Inc.
c. Cetco CRD-C 513
d. Synko-Flex Waterstop, Henry Company.

B. Sand Cushion: Clean, manufactured or natural sand.

C. Preformed Expansion Joint Fillers: Reflex by The JD Russell Company or other expansion joint filler made of Recycled rubber (tires).

2.5 CONCRETE CURING MATERIALS

A. Moisture-Retaining Cover: One of the following, complying with ANSI-ASTM C171 for concrete floors that are to be exposed or to receive floor sealer. Contractor's option to obtain specified requirements for concrete slabs-on-grade. Coordinate uses with finish material manufacturer's specifications.
1. Waterproof paper.
2. Polyethylene film.
3. Polyethylene-coated burlap.

B. Water Based Acrylic Liquid Membrane-Forming Curing Compound: Liquid-type membrane-forming curing compound complying with ASTM C 309, Type I, Class B, with 18 to 20 percent minimum solids.
1. Products: Subject to compliance with requirements, provide one of the following:

a. Safe Cure and Seal (J-18), Dayton Superior Corp.
b. Aqua-Cure VOX, Euclid Chemical Co.
c. Kure-N-Seal, WB, Degussa Building Systems
d. Spartan Coate WBII, The Burke Group.

C. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.
1. Products: Subject to compliance with requirements, provide one of the following:

a. Eucobar, Euclid Chemical Co.
b. E-Con, L&M Construction Chemicals, Inc.
c. Confilm, Degussa Building Systems
d. Finishing Aid, The Burke Group.

D. Concrete curing materials shall be approved by the manufacturer of the product for the final finish on the concrete slabs. Submit written approval/certification.

2.6 SELF-LEVELING UNDERLAYMENT

A. Free-flowing, self-leveling, pumpable, cement-based compound for applications from 1 inch thick to feathered edges. (If required for patching and repairing).
1. Compressive strength: 4100 psi minimum at 28 days
2. Flexural strength: 1300 psi at 28 days
3. Tensile strength: 750 psi at 28 days
4. Shrinkage: .025 after 7 days

B. Manufacturers:
1. "Thoro Underlayment": Thoro System Products, Centerville, Indiana.
2. "Ardex K-15": Ardex, Inc. Pittsburgh, Pennsylvania.
3. "300 Premium Underlayment": The Burke Group, Converse, Texas.

2.7 CONCRETE UNDERLAYMENT

A. One-component, cement-based trowel grade underlayment. (If required for patching and repairing).
   1. Compressive strength: 4250 psi minimum at 28 days
   2. Flexural strength: 1000 psi minimum at 28 days
   3. Tensile strength: 650 psi minimum at 28 days

B. Manufacturer:
   1. "Thoro Underlayment Trowel Grade": Thoro System Products, Centerville, Indiana.
   2. “Burke Feather Patch”: The Burke Group, Converse, Texas.

2.8 BONDING AGENT

A. Chemical Bonding Agent: Film-forming, freeze-thaw resistant compound suitable for brush or spray application complying with MIL-B-19235. Subject to compliance with requirements, provide one of the following:
   1. Adbond (J40); Dayton Superior Corp.
   2. Eucoweld; Euclid Chemical
   3. Everbond; L & M Construction Chemicals
   4. Thorobond; Degussa Building Systems
   5. Intralok; W.R. Meadows, Inc.
   6. Acrylic Bondcrete, The Burke Group

2.9 CONCRETE PATCHING COMPOUND

A. Single-component, cement based, polymer modified patching mortar with low slump properties.
   1. "Thorite 100" by Thoro System Products, Centerville, Indiana
   2. “V/O Patch” by The Burke Group, Converse, Texas.

2.10 ADMIXTURES, GENERAL

A. Use air-entraining admixture in exterior concrete, unless otherwise indicated. Add air-entraining admixture at the manufacturer's prescribed rate to result in concrete at the point of placement having air content within the following limits:
   1. Concrete structures and slabs exposed to freezing and thawing or subjected to hydraulic pressure:
      a. 3 to 15 percent for maximum 2 inches aggregate.
      b. 4-1/2 percent to 6-1/2 percent for maximum 1-inch aggregate.
      c. 5 to 7 percent for maximum 3/4-inch aggregate.
      d. 6 to 8 percent for maximum 1/2-inch aggregate.
   2. Other Exterior Concrete: 2 to 4 percent

B. Use of admixtures for water-reducing and set-control shall be permitted only with prior approval of the Architect for each condition and shall be in strict compliance with the manufacturer's directions.
   1. Design mix submittals shall include these admixtures and shall indicate for which types of concrete structures they are to be used.

C. Use amount of admixtures s recommended by manufacturer for climatic conditions prevailing at time of placing. Adjust quantities and types of admixtures as required to maintain quality control.

2.11 CONCRETE MIXING

A. Ready-Mixed Concrete: Comply with requirements of ASTM C 94, and as specified.

1. When air temperature is between 85 deg F and 95 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 95 deg F, reduce mixing and delivery time to 60 minutes.
2. Delete the references for allowing additional water to be added to the batch for material with sufficient slump. Addition of water to the batch will not be permitted.
3. During hot weather or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be required.

PART 3 - EXECUTION

3.1 GENERAL

A. Coordinate the installation of joint materials, vapor retarder/barrier, and other related materials with placement of forms and reinforcing steel.

3.2 PREPARATION

A. Pre-placement Inspection: Before placing concrete, inspect and complete the formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit the installation of their work; cooperate with other trades in setting such work, as required.
   1. Inspect soil at bottom of foundation systems which will be subject to testing for soil bearing value by the testing laboratory, as directed by the Architect. Place concrete immediately after approval of foundation excavations.
   2. Inspect underslab drainage course areas that were subject to testing for soil bearing value by the testing laboratory as required by Architect. Place concrete immediately after approval of underslab compaction tests.

B. Material placement for interior slabs on grade and exterior concrete stoops.
   1. Under building slabs at wood floor areas, use satisfactory excavated or borrow material to 6 inches below concrete then use drainage fill material and moisture barrier to bottom concrete.
   2. Under remaining building slabs use satisfactory excavated or borrow material to 8 inches below concrete; then place and compact 4 inches of drainage fill material; then place vapor barrier, lapping joints and 6 inches minimum and seal with tape or mastic, lap and fold joints and turn membrane up on walls to top of floor. Do not puncture membrane. Vapor barrier not required for walks and exterior slabs. Then place and compact top 4 inches of drainage to fill bottom of concrete.
   3. Install and properly anchor the slab reinforcing mesh.
   4. Position waterstops and expansion joint fillers where indicated on the Drawings and as recommended by manufacturer. Special precautions shall be taken to avoid collapse during installation.

3.3 JOINTS

A. Construction Joints: Locate and install construction joints so they do not impair strength or appearance of the structure, as acceptable to Architect.
   1. Construction joints should be formed per ACI 318, cleaned, laitance removed, wetted, standing water removed.

B. Provide keyways at least 1-1/2 inches deep in construction joints in walls and slabs and between walls and footings. Bulkheads designed and accepted for this purpose may be used for slabs.

C. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as indicated otherwise. Do not continue reinforcement through sides of strip placements.

D. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.

E. Waterstops: Provide waterstops in construction joints as indicated. Install waterstops to form continuous diaphragm in each joint. Support and protect exposed waterstops during progress of Work. Field-fabricate joints in waterstops according to manufacturer's printed instructions.

F. Isolation Joints in Slabs-on-Grade: Construct isolation joints in slabs-on-grade at points of contact between slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
   1. Joint fillers and sealants are specified in Division 07.

G. Contraction (Control) Joints in Slabs-on-Grade: Construct contraction joints in slabs-on-grade to form panels of patterns as shown. Use saw cuts 1/8-inch-wide by one-fourth of slab depth or inserts 1/4-inch-wide by one-fourth of slab depth, unless otherwise indicated.
   1. Form contraction joints by inserting pre-molded plastic, hardboard, or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.
   2. Contraction joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.
   3. If joint pattern is not shown, provide joints not exceeding 12 feet in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third bays).
   4. Joint fillers and self-leveling sealants are specified in Division 07.

H. Expansion Joints
   1. Provide pre-molded joint filler for expansion joints abutting concrete curbs (except in integral walk and curb), catch basins, manholes, inlets, structures, masonry walls, and other fixed objects.
   2. Set and secure continuous expansion joint strips where edge of slab abuts vertical surfaces.
   3. Locate expansion joints at 30 feet o.c. for walks and curbs, unless otherwise shown.
   4. Extend joint fillers full-width and depth of joint, flush with finished surface. Furnish joint fillers in one-piece lengths for the full width being placed, wherever possible. Where more than one length is required, lace or clip joint filler sections together. Form top edge of filler to conform to top profile of concrete.

3.4 INSTALLING EMBEDDED ITEMS

A. Set and build into formwork anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.

B. Install reglets to receive top edge of foundation sheet waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.

C. Install dovetail anchor slots in concrete structures as indicated on drawings.

D. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to

achieve required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

3.5 PREPARING FORM SURFACES

A. Coat contact surfaces of forms with an approved, non-residual, low-VOC, form-coating compound before placing reinforcement.

B. Do not allow excess form-coating material to accumulate in forms or come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply according to manufacturer's instructions.

1. Coat steel forms with a non-staining, rust-preventative material. Rust-stained steel formwork is not acceptable.

3.6 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified.

C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation at its final location.

1. Concreting shall be carried on at such a rate that at all times the concrete is at all times plastic and flows readily into spaces between reinforcement.
2. Prohibit the following concrete

    a. Partially hardened concrete
    b. Contaminated concrete
    c. Re-tempered concrete
    d. Concrete that has been re-mixed after it has taken its initial set

D. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309.
2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix to segregate.

E. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until completing placement of a panel or section.

1. Consolidate concrete during placement operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.
2. Bring slab surfaces to correct level with a straightedge and strike off. Use bull

floats or darbies to smooth surface free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.

3. Maintain reinforcing in proper position on chairs during concrete placement.

F. Cold-Weather Placement: Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

G. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.

1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
2. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.

H. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305 and as specified.

1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 95 deg F. Mixing water may be chilled 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. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.
4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Architect.

3.7 FINISHING FORMED SURFACES

A. Rough-Formed Finish: Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished Work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.

B. Smooth-Formed Finish: Provide a smooth-formed finish on formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or another similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.

C. Smooth-Rubbed Finish: Provide smooth-rubbed finish on scheduled concrete surfaces that have received smooth-formed finish treatment not later than 1 day after form removal.

1. 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.

D. Grout-Cleaned Finish: Provide grout-cleaned finish on scheduled concrete surfaces that

have received smooth-formed finish treatment.

1. Combine one-part portland cement to one and one-half parts fine sand by volume, and a 50:50 mixture of acrylic or styrene butadiene-based bonding admixture and water to form the consistency of thick paint. Blend standard portland cement and white portland cement in amounts determined by trial patches so that final color of dry grout will match adjacent surfaces.
2. Thoroughly wet concrete surfaces, apply grout to coat surfaces, and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.

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.

3.8 MONOLITHIC SLAB FINISHES

A. General Information (Slabs on Grade): The requirements indicated are based upon the latest FF/FL method. Bids for this work shall reflect these requirements and enforcement thereof can be expected.

B. Typical Corridors and Normal Sized Rooms:
1. Specified Overall Value: FF 30/FL 23
2. Minimum Local Value: FF 25/FL 20
3. Apply trowel finish to slab surfaces that are to be covered with resilient flooring, paint, or other thin film finish coating system.

C. Large Rooms and Public Areas:
1. Specified Overall Value: FF 36/FL 25
2. Minimum Local Value: FF 30/FL 22
3. Apply trowel finish to monolithic slab surfaces that are to receive resilient flooring, carpet, or other thin finish system.

D. High Tolerance Floors where indicated:
1. Specified Overall Value: FF 50/FL 30
2. Minimum Local Value: FF 40/FL 25
3. Apply trowel finish to slab surfaces that are to be covered with wood flooring, paint, or other thin finish coating system.

E. Nonslip Broom Finish (NsBrm-Fn): Apply nonslip broom finish to exterior concrete with fiber bristle broom, perpendicular to main traffic route. Coordinate required final finish with the Architect before application.

F. Elevated slabs shall have a specified overall value of FF 22 to FF 27 and a minimum local of FF 20 with no FL number defined.

3.9 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as specified to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with diagrams or templates of manufacturer

furnishing machines and equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in safety inserts and accessories as shown on drawings. Screed, tamp, and trowel-finish concrete surfaces.

3.10 CONCRETE CURING AND PROTECTION

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before power floating and troweling.

B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing.

C. Curing Methods: Cure concrete by curing compound, by moist curing, by moisture-retaining cover curing, or by combining these methods, as specified. Curing methods are contractor’s option to obtain finishes as required. Coordinate curing method with floor finish manufacturer. Do not use certain methods as may be required by the floor finish manufacturer. Moist cure methods are highly recommended.

D. Provide moisture curing by the following methods:

1. Keep concrete surface continuously wet by covering with water for not less than 72 hours.
2. Concrete wet cure time of 7 days minimum at 50 degrees minimum temperature. ACI 318-11, Section 5.11.1, also, FBC Section 19
3. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with a 4-inch lap over adjacent absorptive covers.

E. Provide 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 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

F. Apply curing compound on exposed interior slabs and on exterior slabs, walks, and curbs as follows:

1. Apply curing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
2. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.

G. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for the full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

H. Curing Unformed Surfaces: Cure unformed surfaces, including slabs, floor topping, and other flat surfaces, by applying the appropriate curing method.

1. Final cure concrete surfaces to receive finish flooring with a moisture-retaining cover, unless otherwise directed.
2. Concrete floor surfaces scheduled to receive tile installations shall have been

moist cured; curing of these surfaces by sprayed chemical curing compounds is not permitted.

3.11 SHORES AND SUPPORTS

A. Comply with ACI 347 for shoring and reshoring in multistory construction, and as specified.

B. Extend shoring from ground to roof for structures four stories or less, unless otherwise permitted.

C. Extend shoring at least three floors under floor or roof being placed for structures over four stories. Shore floor directly under floor or roof being placed, so that loads from construction above will transfer directly to these shores. Space shoring in stories below this level in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members where no reinforcing steel is provided. Extend shores beyond minimums to ensure proper distribution of loads throughout structure.

D. Remove shores and re-shore in a planned sequence to avoid damage to partially cured concrete. Locate and provide adequate re-shoring to support work without excessive stress or deflection.

E. Keep re-shores in place a minimum of 15 days after placing upper tier, or longer, if required, until concrete has attained its required 28-day strength and heavy loads due to construction operations have been removed.

3.12 REMOVING FORMS

A. Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.

B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may not be removed in less than 14 days or until concrete has attained at least 75 percent of design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.

C. Form-facing material may be removed 4 days after placement only if shores and other vertical supports have been arranged to permit removal of form-facing material without loosening or disturbing shores and supports.

3.13 REUSING FORMS

A. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.

B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use patched forms for exposed concrete surfaces except as acceptable to Architect.

3.14 CONCRETE SURFACE REPAIRS

A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removing forms, when acceptable to Architect.

B. Mix dry-pack mortar, consisting of one-part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and

placing.

1. Cut out honeycombs, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts down to solid concrete but in no case to a depth less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with bonding agent. Place patching mortar before bonding agent has dried.
2. For surfaces exposed to view, blend white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas 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.

C. Repairing Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes and fill with dry-pack mortar or precast cement cone plugs secured in place with bonding agent.

1. Repair concealed formed surfaces, where possible, containing defects that affect the concrete's durability. If defects cannot be repaired, remove and replace the concrete.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface tolerances specified for each surface and finish. Correct low and high areas as specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having the required slope.

1. Repair finished unformed surfaces containing defects that affect the concrete's durability. Surface defects include crazing and cracks in excess of 0.01-inch-wide or that penetrate to the reinforcement or completely through non-reinforced sections regardless of width, spalling, pop-outs, honeycombs, rock pockets, and other objectionable conditions.
2. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.
3. Correct low areas in unformed surfaces 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. Proprietary underlayment compounds may be used when acceptable to Architect.
4. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

E. Repair isolated random cracks and single holes 1 inch or less in diameter by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Place dry-pack before bonding agent has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

F. Perform structural repairs with prior approval of Architect for method and procedure,

using specified epoxy adhesive and mortar.

G. Repair methods not specified above may be used, subject to acceptance of Architect.

3.15 UNDERLAYMENTS

A. Install in strict accordance with manufacturer's written installation instructions and provide primers as recommended.

END OF SECTION 033000

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SECTION 040513:
MASONRY MORTARING

PART 1 – GENERAL

1.1 SUMMARY

A. This Section specifies the mortar for unit masonry materials specified in the following Sections:
   1. Concrete masonry units, Section 042200

1.2 SUBMITTAL

A. All required submittals shall be approved prior to the start of masonry construction.
B. Product Data: Proposed prepared masonry cement.
C. Proposed mortar mix design(s) including identities and proportions of ingredients as well as adherences to standards where specified.
D. Test results from mortar cube breaks reporting compressive strength of mortar.
E. Provide certification, in writing, that materials meet requirements of ASTM C1142.

1.3 QUALITY ASSURANCE

A. Codes and Specifications: Comply with the provisions of the following codes specifications, and standards, except as otherwise shown or specified.
   1. ACI 530/ASCE 5/TMS 402-11 Building Code Requirements for Masonry Structures
   2. ACI 530.1/ASCE 6/TMS 602-11 Specifications for Masonry Structures
   3. NCMA-TEK 20B Mortars for Concrete Masonry
   4. ASTM C144, Aggregate for Masonry Mortar
   5. ASTM C150, Portland Cement
   6. ASTM C207, Hydrated Lime for Masonry Purposes
   7. ASTM C270, Mortar for Unit Masonry
B. Field Quality Control.
   1. Materials may require testing and re-testing, as directed by the Architect, during the progress of the Work. Allow free access to material stockpiles and facilities. Tests shall be performed at the Contractor's expense.
   2. Do not change source or brands of masonry mortar material during the course of the Work. If changes become necessary, resubmit data for material being changed and for tests of materials in which the changed material is and ingredient.

1.4 TESTS FOR MORTAR

A. Test for compressive strength by the methods of sampling and testing of ASTM C109 and ASTM C780.
   1. Provide a minimum of one set of cubes for testing per 5,000 sq. ft. of masonry wall construction and as directed by Architect.
B. Submit written reports for each material sampled and tested. Provide Project name and number, date of report, name of contractor, name of testing service, source of aggregates, material manufacturer and brand name for manufactured materials, values specified in the referenced specification for each material, and test results. Indicate whether or not material is acceptable for intended use.

C. If the compressive strength tests fail to meet the minimum requirements specified, the mortar represented by such tests will be considered deficient in strength.
   1. Removed and replaced deficient mortar.

1.5 MATERIAL STORAGE, DELIVERY, AND HANDLING

A. Store mortar materials off the ground, under cover, using tarpaulins, felt paper, or polyethylene sheets in a dry location.
B. Deliver and store manufactured products in original unopened containers.
C. Store cementitious ingredients in weather-tight enclosures and protect against contamination.
D. Stock piles and handle aggregates to prevent contamination form foreign materials.

1.6 ENVIRONMENTAL REQUIREMENTS

A. To assure mortar temperatures between 40 degrees F and 120 degrees F until used heat mixing water or aggregates when air temperature is between 32 degrees F and 40 degrees F. When the air temperature is between 25 degrees F and 32 degrees F, heat both water and aggregate.
B. Produce subsequent mortar batches within plus or minus 10 degrees of first batch.
C. Do not heat water or sand above 160 degrees F.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Portland Cement: ASTM C150, Type I, non-staining, without air entertainment and of natural color or white, to produce the required color of mortar or grout.
B. Masonry Cement: Current ASTM C91, non-staining, with 12 to 22 percent air content by volume.
C. Hydrated Lime: ASTM C207, Type S
D. Aggregates: ASTM C144, except for joint less than 1/4 inch, use aggregate graded with 100 percent passing the No. 16 sieve.
E. Water: Clean, free of deleterious materials which would impair strength or bond.
F. Ready Mixed Mortar: ASTM C270 Standard Specification for ready mixed mortar for unit masonry.
G. Integral Water Repellent Admixture: “Dry-Block Water Repellent Mortar Admixture” as manufactured by Grace Construction Products, Cambridge, MA.

2.2 MORTAR MIXES

A. Do not lower the freezing point of mortar by use of admixture or anti-freeze agents.
   1. Do not use calcium chloride in mortar.
B. Mortar for Unit Masonry: Comply with ASTM C270, Property Specification, Proportion Specifications, or ASTM C1142.
   1. Type M: 2500 psi average compressive strength at 28 days for masonry in contact with the earth.
   2. Type S: 1800 psi average compressive strength at 28 days for other masonry conditions.

C. Use gray (non-colored) mortar for interior and non-exposed concrete block masonry.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Section 042200, Concrete Unit Masonry.

END OF SECTION 040513

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SECTION 040516:
MASONRY GROUTING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies the masonry grout for unit masonry materials specified in the following Sections:
   1. Concrete masonry units, Section 042200

B. The types of masonry grout required include the following:
   1. Fine grout
   2. Coarse grout
   3. Grout for use in hollow metal frames

1.2 SUBMITTALS

A. Product Data: Proposed portland cement

B. Proposed grout mix designs for both fine and coarse grouts including complete identities and proportions of ingredients as well as adherences to standards where specified. All grout shall be plant-mix.

C. Compression test results from an independent certified testing laboratory from grout samples made from the proposed grout mix design. Test reports may be from previous Projects within the previous 6 months.

1.3 QUALITY ASSURANCE

A. Standards: Comply with the provisions of the following in accordance with the current Florida Building Code (with applicable supplements), except as otherwise shown or specified.
   1. ACI 530/ASCE 5 Building Code Requirements for Masonry Structures.
   2. ACI 530.1/ASCE 6 Specifications for Masonry Structures.
   3. NCMA-TEK 23-A Grouting for Concrete Masonry Walls.

A. Field Quality Control
   1. Materials may require testing and re-testing, as directed by the Architect, during the progress of the Work. Allow free access to material stockpiles and facilities. Tests will be performed at the Contractor's expense.
   2. Do not change source or brand of masonry grout materials during the course of the Work. If changes become necessary, resubmit data for material being changed and for tests of materials in which the changed material is an ingredient.

1.4 MATERIAL STORAGE

A. Store grout materials off the ground, under cover, using tarpaulin, felt paper, or polyethylene sheets and in a dry location.

1.5 TESTS FOR GROUT

A. Provide a minimum of one set of 3 test specimens for testing per 5000 square feet of masonry wall construction and as directed by the Architect.

B. Submit written reports for each material sampled and tested. Provide Project name and number, date of report, name of contractor, name of testing service, source of aggregates, material manufacturer and brand name for manufactured materials, values specified in the referenced specification for each material, and test results. Indicate whether or not material is acceptable for intended use.

C. If the compressive strength tests fail to meet the minimum requirements specified, the grout represented by such tests shall be considered deficient in strength.
   1. Removed and replaced deficient mortar.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portland Cement: ASTM C150, Type I, unless otherwise acceptable to Architect.

B. Flyash: ASTM C618-97, Type C or F may be substituted for up to 20 percent of the portland cement in the grout mix.

C. Fine Aggregates: Clean, sharp, natural sand free from loam, clay lumps, or other deleterious substances.

D. Coarse Aggregates: Clean, uncoated, pea gravel containing no clay, mud, loam, or foreign matter. Maximum aggregate size 3/4-inch.

E. Water: Clean, free of deleterious materials which may impair strength or bond.

2.2 GROUT MIXES

A. Do not use calcium chloride in grout

B. Grout, comply with ASTM C476.
   1. Fine Grout: 2500 psi average compressive strength at 28 days.
   2. Coarse Grout: 2500 psi average compressive strength at 28 days.
   3. Use fine grout in all hollow metal frames.

C. Grout Proportions (by volume): Comply with Table 1, ASTM C476.
   1. Fine Grout: 1-part portland cement, 0 to 1/10 part hydrated lime or lime putty, 2-1/4 to 3 parts fine aggregate.
   2. Coarse Grout: 1-part portland cement, 0 to 1/10 part hydrated lime or lime putty, 2-/1/4 parts fine aggregate, 1 to 2 parts coarse aggregate.

D. Grout Slump: 9 to 11 inches.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Section 042200, Concrete Unit Masonry.

B. Grout all steel frames installed in concrete and CMU walls. Do not install until asphaltic emulsion back coating has dried. Refer to Section 08 11 01- Steel Doors and Frames.

3.2 SAMPLING AND TESTING

A. Sampling and Testing of Grout: NCMA-TEK 107.
   1. Place a piece of wood 1-5/8 inch thick and 3 inches by 3 inches on a level surface. Four masonry units with permeable paper, such as absorptive paper toweling, taped to one face shell are placed around the wood block to form the mold. The resulting mold is approximately 3 inches square by 6 inches high. Pour grout into the mold in two layers. Rod each layer 25 times with a 1 x 2

wood puddling stick to eliminate air bubbles. Puddle the bottom layer throughout its depth. Distribute the strokes uniformly over the cross-section of the mold. For the upper layer, allow the stick to penetrate about 1/2 inch into the underlying layer. After the second lift has been puddled, level the top of the prism with a trowel and immediately cover the prism with wet burlap or similar material to keep it damp. Protect the prisms against extreme changes in temperature, and after 48 hours, remove the masonry units and carefully pack the samples for transport to the laboratory where they will be stored in a moist room until tested.

2. Cap the specimens in accordance with the applicable provisions of "Method of Capping Cylindrical Concrete Specimens," ASTM C617. The sample should be tested in a damp condition in accordance with the applicable provisions of ASTM C39 "Methods of Test Compressive Strength of Molded Concrete Cylinders."
3. Three test samples shall be made and tested for each type of grout to be used in the work.

END OF SECTION 042200

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SECTION 040523:
MASONRY ACCESSORIES

PART 1- GENERAL

1.1 SUMMARY

A. Section includes masonry accessories for unit masonry materials specified in:
   1. Concrete masonry units, Section 042200

B. The types of masonry accessories required include the following:
   1. Continuous horizontal wire reinforcing and ties
   2. Individual metal ties
   3. Anchoring devices
   4. Neoprene expansion joint filler
   5. Rubber control joints
   6. Concealed and through-wall flashings built into masonry work
   7. Reinforcing bars in masonry lintel block and hollow metal door frame heads
   8. Vertical bars for concrete masonry
   9. Caging devices and centering clips for alignment of vertical reinforcing bars
   10. Grouted anchor bolts
   11. Preformed expansion joint material
   12. Column isolation

1.2 SUBMITTALS

A. All submittals shall be approved prior to the start of masonry construction.

B. Product Data, with particular items to be provided, clearly marked, for:
   1. Masonry joint reinforcement
   2. Masonry in-wall flashing
   3. Neoprene expansion joint filler
   4. Rubber control joint

C. Samples at project site for review:
   1. Masonry ties and anchoring devices.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Provide masonry reinforcing as manufactured by one of the following:
   1. Heckmann Building Products, Inc., Chicago, Illinois; http://www.heckmannbuildingprods.com
   2. Dur-O-Wal, Inc., Aurora, Illinois; http://www.dur-o-wal.com
   3. Masonry Reinforcing Corp. of America, Charlotte, North Carolina; http://www.wirebond.com
   4. Hohmann & Barnard, Inc., Hauppauge, New York; http://www.h-b.com

2.2 MATERIALS

A. Continuous Wire Reinforcing and Ties for Masonry

1. Provide welded wire units prefabricated in straight lengths of not less than 10 feet, with matching pre-fabricated corner ("L") and intersection ("T") units.
2. Fabricate from cold-drawn steel wire complying with ASTM A1064, with deformed or embossed continuous side rods and plain cross-rods, with unit width of 1-1/2 to 2 inches less than thickness of wall partition.
3. Wire shall be galvanized in accordance with the following:

    a. Joint reinforcement, interior walls: Mill galvanized wire ASTM A641 Class 1 (0.40 oz. per sq. ft.)
    b. Wire ties or anchors in exterior walls completely embedded in mortar or grouts: Mill galvanized ASTM A641 Class 3 (0.80 oz. per sq. ft.)
    c. Wire ties or anchors in exterior walls not completely embedded in mortar or grout (includes cavity walls): Hot dip galvanized ASTM A153 Class B2 (1.50 oz. per sq. ft.)
    d. Joint reinforcement in exterior walls or interior walls exposed to moist environments such as showers, food service areas, and toilet rooms: Hot dip galvanized ASTM A153-B2 (1.50 oz. per sq. ft.)
    e. Sheet metal ties or anchors exposed to weather metal: Hot dip galvanized ASTM A153 B2 (0.60 oz. per sq. ft.)
    f. Sheet metal ties or anchors completely embedded in mortar or grout: ASTM A653 B2 (0.60 oz. per sq. ft.)

4. For single wythe interior CMU walls, provide truss ladder type joint reinforcing fabricated with two 9 gage steel side rods and 9 gage cross rods. Joint reinforcing shall be placed in every other CMU joint or not more than 16 inches o.c.
5. For single wythe foundation walls, provide truss ladder type joint reinforcing fabricated with two 9 gage steel rods and 9 gage cross rods. Joint reinforcing shall be placed in every CMU joint or no more than 8 inches o.c.

B. Adjustable Masonry Wall Ties: Shall be fabricated from 3/16 inch cold-drawn galvanized steel wire, complying with ASTM A1064, of the length required for proper embedment in wythes of masonry shown, or crimped if used in cavity wall construction. Provide either "rectangular" or "Z" ties for proper anchorage in mortar joint.

C. Anchoring Devices for Masonry
1. Rigid Anchors: Where masonry is to be rigidly anchored to structural steel beams, such as lintel beams, provide galvanized steel straps, bars, or rods welded to the steel beam and extending into the mortar joint. Straps shall be not less than 14 gage in thickness. Bars and rods shall be not less than 1/4 inch in diameter.
2. Flexible Anchors: Where masonry is to be laterally supported from structural steel, while permitting only vertical movement or both vertical and horizontal movement, provide flexible anchors consisting of 2 different components as follows:

    a. Web Ties or Beam Ties: Shall be 3/16-inch galvanized steel wire, ASTM A1064, 12 inches long with width being approximately 2 inches less than nominal wall thickness. Provide ties with blunt end when used

with strap anchors, and provide ties with tapered end when used with rod anchors. This type tie shall permit only vertical movement and shall be installed parallel to masonry walls that abut steel columns.

b. Triangular Ties: Shall be 3/16-inch galvanized steel wire, ASTM A1064, lengths as required to extend to within 5/8 inch of opposite face of masonry. Closed end shall be 1 inch wide, and split-end opening shall be 1/2 inch. This type tie shall permit both vertical and horizontal movement and shall be installed where masonry by-passes steel columns and where masonry is parallel and adjacent to steel beams and joists.

c. Flexible anchors: Where masonry is to be laterally supported from cast-in-place or precast concrete, provide 22 gage galvanized dovetail slots with 3/16-inch diameter galvanized triangular ties.

3. Dowels on Lintels: Where masonry is supported on the top of lintels and plates provide #4 reinforcing bar by 6-inch rods or 1/2-inch diameter by 6 inch headed studs at 32 inch spacing, unless otherwise noted, welded to top of steel and extending into cores or cavity of masonry above. Grout cores or cavity at rods.

D. Neoprene Expansion Joint Filler (for face brick)

1. Provide expansion joints in exterior brick masonry conforming to ASTM D-1056 where indicated on the Drawings. The following products are acceptable:

a. "Neo-Seal IV 2218-3" as manufactured by Williams Products, Inc., Troy, Michigan; or Architect approved equal; http://www.sweets.com/index/mfg.htm?site=undefined&id=624

E. Rubber Control Joints

1. Provide rubber control joints designed for standard sash block in CMU walls where control joints (CJ) are indicated on the Drawings or as specified in Section 04200. The following products are acceptable. Rubber control joints shall conform to ASTM D2000.

a. Basis of Design: “Everlastic Slot Seal Std. 2015-3” as manufactured by Williams Products, Inc., Troy, Michigan. http://www.sweets.com/index/mfg.htm?site=undefined&id=624

b. Other equal products as manufactured by Dur-o-wal or Heckman are acceptable.

F. Through-Wall Flashing:

1. Provide flashings, shown to be built into masonry, extended, exposed beyond the exterior surface of the wall.

a. Firestone FLASHGUARD, EPDM Rubber Membrane, 40mil thickness

b. Stainless steal: 0.0156 thick, ASTM A 240, Type 304

2. All masonry wall flashings are to be set in a bed of mortar and covered with a bed of mortar.

3. All seams shall be welded and watertight.

a. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of

type recommended by stainless-steel sheet manufacturer

G. Reinforcing Bars
   1. Size, length, and spacing shall be as indicated on the Drawings.
   2. Where No.3 and larger are indicated, they shall be deformed steel, conforming to ASTM A615, Grade 60.

H. Intersecting Masonry Wall Joint Reinforcing: Horizontal bed joint reinforcement for conditions where interior non-load-bearing masonry walls intersect exterior or interior load-bearing walls at 90 degrees shall be wire mesh wall ties made of 1/2-inch mesh by 16 gage hot dip mill-galvanized wire, 1 inch less in width than width of wall.

I. Column Isolation: Around all columns in masonry walls, provide 3/8 inch "Ceramar Flexible-Foam" expansion joint filler as manufactured by W.R. Meadows, Inc.; http://www.wrmeadows.com; or Architect approved equal.

J. Caging Devices and Centering Clips
   1. In hollow concrete masonry cores or brick cavities to be reinforced with vertical reinforcing steel bars and filled with grout, provide 9 gage galvanized steel caging devices. The following products are acceptable:

      a. Rebar Positioner AA239, AA Wire Products Company, Chicago, Illinois; or Architect approved equal.
      b. Rebar Positioner 3400, Masonry Reinforcing of America, Charlotte, North Carolina; or Architect approved equal.
      c. Spider Type Rebar Positioner, National Wire Products Industries, Baltimore, Maryland; or Architect approved equal.

K. Grouted Anchor Bolts
   1. In hollow concrete masonry units: Refer to Structural drawings.

L. Preformed Expansion Joint Material: Provide closed cell polyethylene expansion joints equal to "Expansion-Joint Filler" by Sonneborn Building Products; or Architect approved equal. http://www.chemrex.com/sonneborn/index.htm

PART 3 - EXECUTION

3.1 INSTALLATION

A. See Section 042200, Concrete Unit Masonry, for installation of masonry accessories specified under this Section.

END OF SECTION 040523

SECTION 042200:
CONCRETE UNIT MASONRY

PART 1 – GENERAL

1.1 SUMMARY

A. Provide labor, materials, and equipment necessary for complete installation of unit masonry as shown on the Drawings and specified herein.

B. Work installed under this Section, but materials or products furnished under the following Divisions or Sections:
   1. Masonry mortar furnished under the Work of Section 040513.
   2. Masonry grout furnished under the Work of Section 040516.
   3. Masonry accessories furnished under the Work of Section 040523.
   4. Anchor bolts, steel plates, and steel lintels; refer to Division 5
      a. Installation of lintels in masonry walls shall be included under the Work of this Section.
   5. Wood bucks and nailing blocks in masonry construction; refer to Division 06.

C. Work installed under this Section, but materials or products furnished under the following Divisions or Sections:
   1. Architectural Concrete Unit Masonry furnished under the work of Section 042223.

D. Cooperate with other trades requiring items of equipment or services to be installed within or in conjunction with Unit Masonry Work.

E. Other Materials provided and installed by this Section:
   1. Integral color if required by Architect
   2. Integral water repellent additive
   3. Masonry cleaners

1.2 SUBMITTALS

A. Test report from independent laboratory showing result of efflorescent test conducted per ASTM C67 for each provided face brick type.

B. Upon regular presentation within past 6 months of representative units by approved manufacturer, a test report from an independent laboratory showing resultant weight, compressive strength (based on net area), and water absorption properties, as well as adherences to standards where so specified, for:

   Name of Manufacturer
   Date of Manufacture of Test Specimen
   Dimension Measurements (in.)
   Calculated Gross Area (sq.in.)
   Calculated Net Area (sq.in.)
   Total Load (lbs.)
   Net Unit Load (psi)
   Sample Weight (lbs.)

Dry Weight (lbs.)
Wet Weight (lbs.)
Immersed Weight (lbs.)
Density (pcf)
Moisture Content (%)
Absorption (%)

C. Letter from approved manufacturer certifying that provided units will meet or exceed qualities of tested representative units for:
   1. Each proposed type of concrete masonry unit.
D. Mock-up panels as erected on site grounds are only samples required.
E. Approved manufacturer's published complete product data, with particular items to be provided clearly marked thereon, for:
   1. Proposed masonry cavity wall insulation.
   2. Integral color if required by Architect.
   3. Integral water repellant additive.
F. A test report from an independent testing laboratory showing compressive strength of concrete masonry prisms constructed from the concrete masonry units and mortar to be used in the masonry work for:
   1. Each proposed type and size of concrete masonry unit as required on the Reinforced Masonry Plans in the Drawings.
G. Submit minutes from pre-installation conference.
H. Fire-rated CMU certification.
I. Installer’s examination report.
J. Submit written masonry inspection reports as specified in 1.3.C herein.

1.3 QUALITY ASSURANCE

A. Standards: Comply with the provisions of the following in accordance with the Florida Building Code 8th Edition (2023), except as otherwise shown or specified.
   1. ACI 530/ASCE 5/TMS 402-14 Building Code Requirements for Masonry Structures
   2. ACI 530.1/ASCE 6/TMS 602-14 Specifications for Masonry Structures
   3. NCMA-TEK 70A Concrete Masonry Prism Strength.
   4. NCMA-TEK 132
   5. NCMA-TEK 23A Grouting for Concrete Masonry Walls.
   6. NCMA-TEK 65 Field Inspection of Engineered Concrete Masonry.
   7. ASTM C140 Standard Methods of Sampling and Testing Concrete Masonry Units.
   8. Comply with ALL NCMA-TEK Standards.
B. Changes in the source or brand of masonry materials during construction will require resubmission and re-testing at the Contractor's expense.
C. Job Mock-Up (if required by Archited)
   1. Prior to installation of masonry work, erect sample wall panel mock-up using materials, bond, and joint tooling shown or specified for final work. Provide special features as directed for caulking and contiguous work. Build mock-up at the site, where directed, of full thickness and approximately 4'x4', unless otherwise shown, indicated the proposed range of color, texture, and workmanship to be expected in the completed work. Erect panels with finish

face of panels facing south. Obtain Architect's acceptance of visual qualities of the mock-up before start of masonry work. Retain mock-up during construction as a standard for judging completed masonry work. Do not alter, move, or destroy mock-up until work is completed. Provide mock-up panel for the following:

a. Typical exterior CMU wall indicating all of the different types of CMU and finishes as specified herein.
b. Typical interior partition of concrete masonry units.

D. Fire Performance Characteristic: Where indicated, provide materials and construction identical to those of assemblies whose fire resistance has been determined per ASTM E119 by a testing and inspection organization, by equivalent concrete masonry thickness, or by other means acceptable to authorities having jurisdiction.

1.4 TESTS OF CONCRETE MASONRY PRISMS

A. For grout filled and reinforced or un-reinforced concrete masonry or brick masonry wall construction tests for the compressive strength of prisms as described in ASTM C 1388.
1. Provide a minimum of one set of 3 masonry prisms for testing per each 5000 square feet of masonry wall construction as required on the Structural Masonry Plan in the Drawings.

B. Submit written reports for each prism tested provide the project identification name and number, date of report, name of Contractor, name of Testing service, name of material suppliers, specific location where masonry represented by the prism is used, test results, and values specified in the referenced specification. Indicate whether or not tested prism is acceptable for intended use.

C. If the compressive strength tests fail to meet the minimum requirements specified, the concrete masonry represented by such tests shall be considered deficient in strength.

D. Deficient masonry construction shall be removed and replaced by the Contractor without additional cost to the Owner. In lieu or removal and replacement, additional cores may be grouted as required and directed by the Architect without additional cost to the Owner.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver masonry materials to project in undamaged condition.

B. Store and handle masonry units off the ground, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not place until units are in an air-dried condition.

C. Store cementitious materials off the ground, under cover, and in dry location.

D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

E. Store masonry accessories including metal items to prevent corrosion and accumulation of dirt and oil.

1.6 PROJECT CONDITIONS

A. Protect partially complete masonry against weather, when Work is not in progress, by covering top of walls with strong, waterproof, non-staining membrane. Extend membrane at least 2 foot down both sides of walls and anchor securely in place.

B. Protect partially complete masonry walls against wind damage by bracing as required until support of walls is integral with the building structure.

C. Protect masonry against freezing when the temperature of the surrounding air is 40 degrees F and falling. Heat materials and provide temporary protection of complete portions of masonry work. Comply with the requirements of the governing code and with the "Construction and Protection Recommendations for Cold Weather Masonry Construction" of the Technical Notes of Brick and Tile Construction by the Brick Institute of America (BIA).

D. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Remove immediately any grout, mortar, and soil that come in contact with such masonry.
   1. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread 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.

E. Cold-Weather Construction: Comply with referenced unit masonry standard for cold-weather construction and the following:
   1. Do not lay masonry units that are wet or frozen.
   2. Remove masonry damaged by freezing conditions.

F. Hot-Weather Construction: Comply with referenced unit masonry standard.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Comply with referenced unit masonry standard and other requirements specified in this Section applicable to each material indicated.

2.2 MASONRY UNITS

A. Obtain masonry units from one manufacturer for uniform texture and color for each kind required, for each continuous area and visually related areas.

B. Concrete Masonry Units (CMU):
   1. Manufacturer: Shall be member of the National Concrete Masonry Association.
   2. Size: Manufacturer's standard units with face dimensions of 15-5/8 by 7-5/8 inches (actual), 15-5/8 inches by 3-5/8 inches (actual), 7-5/8 inches by 7-5/8 inches.
   3. Special Shapes: Provide, where shown and where required, lintels, inside and outside corners, jambs, sash, control joints, headers, bond beams, bullnoses, and other special conditions.
      a. Provide bullnose corners at all exposed external corners (except at heads), and sills.
      b. Not required at exterior columns, planters, and seat walls.
   4. Hollow Load-Bearing (HL) CMU: Provide units complying with ASTM C90, 2N Class Designation for the aggregates, with a minimum compressive strength of 1900 psi on the net section.
   5. Solid Loadbearing CMU (Solid CMU): Provide units complying with ASTM C90, 2N Class Designation for the aggregates, with a minimum compressive strength of 1900 psi on the gross section.
   6. Lightweight Units: ASTM C331 aggregate, except that aggregate material shall

be limited to blast furnace slag, clay, shale, or slate. Dry net weight shall be not more than 105 lbs. per cu. ft. Strength shall be indicated above.

7. Medium Weight Units: ASTM C33 concrete aggregates for a net weight between 105 pounds and 125 pounds per cu. ft. Strength shall be as indicated above.
8. Normal Weight Units: ASTM C33 concrete aggregates for a dry net weight of not less than 125 pounds per cu. ft. Strength shall be as indicated above.
9. Curing: Cure units in a moisture-controlled atmosphere or in an autoclave at normal pressure and temperature to comply with ASTM C90, Type I. (Linear drying shrinkage shall be 3 percent or less).
10. Curing: Cure units in a non-moisture-controlled atmosphere to comply with ASTM C90, Type II.
11. Exposed Face:
    c. Manufacturer's standard color and texture. Smooth (Sand) face. No open textured block will be accepted.
12. Where CMU walls are indicated as fire-rated, provide materials and construction identical to those of assemblies whose fire resistance has been determined per ASTM E119 by a testing and inspection organization, by equivalent concrete masonry thickness, or by other means as acceptable to authorities having jurisdiction.
13. Fire Rated CMU shall meet requirements of the UL 618 and may be lightweight block manufactured with 100% rotary kiln produced expanded shale, clay, or slate. Blending of screenings or any other deleterious substance which impairs the fire rating is prohibited. The producer of the CMU shall furnish a one-page certification showing conformance with all requirements of UL 618.
14. Provide masonry or precase lintels at all openings greater than 1’-0” in width that occur in CMU walls.

2.3 MASONRY CLEANERS

A. Job-Mixed Detergent Solution: Solution of trisodium phosphate (1/2-cup dry measure) and laundry detergent (1/2-cup dry measure) dissolved in one gallon of water.

B. Job-Mixed Muriatic Solution: Solution of 1-part muriatic acid and 10 parts clean water, mixed in a nonmetallic container with acid added to water.

C. Proprietary Acidic Cleaner: Manufacturer's standard-strength, general-purpose cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry surfaces of type indicated below without discoloring or damaging masonry surfaces; expressly approved for intended use by manufacturer of masonry units being cleaned.

1. For masonry not subject to metallic oxidation stains, use formulation consisting of a concentrated blend of surface-acting acids, chelating, and wetting agents.
2. For dark colored masonry not subject to metallic oxidation stains, use formulation consisting of a liquid blend of surface-acting acids and special inhibitors.
3. For masonry subject to metallic oxidation stains, use formulation consisting of a liquid blend of organic and inorganic acids and special inhibitors.
4. Available Products: Subject to compliance with requirements, a product that may be used to clean unit masonry surfaces includes, but is not limited to, the following:

5. Products: Subject to compliance with requirements, provide the following:

d. "Sure Klean No. 600 Detergent," ProSoCo, Inc.
e. "Sure Klean No. 101 Lime Solvent," ProSoCo., Inc.
f. "Sure Klean Vana Trol," ProSoCo, Inc.

2.4 INTEGRAL WATER REPELLANT ADDITIVE

A. Acceptable Manufacturers: “Dry-Block” by W.R. Grace and Company; or Architect approved equal.
B. Install the integral waterproofing additive in all smooth face CMU, split-face CMU and ground face CMU installed in exterior walls.
C. Integral water repellent additive shall comply with ASTM E514, extended to 72 hours, ASTM C1357, ASTM C1314, and ASTM C1148.
D. Description: Integral liquid polymeric admixture for CMU added during block production.
E. Water Permeance of Masonry: Capable of achieving a Class E Rating when evaluated using ASTM E 514 with the test extended to 72 hours, using the rating criteria specified in ASTM E 514-74.
F. Flexural Bond Strength of Masonry: An increase of minimum 10% in masonry flexural bond strength shall occur as a result of adding integral water-repellent CMU and mortar admixtures when compared to a control (containing no admixtures) CMU and mortar when tested according to ASTM C 1357.
G. Compressive Strength of Masonry Prisms: Maximum 5% decrease in compressive strength of prisms shall occur as a result of adding integral water-repellent CMU and mortar admixtures when compared to a control (containing no admixtures) CMU and mortar when tested according to ASTM C 1314.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other specific conditions, and other conditions affecting performance of unit masonry.
   1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of unit masonry.
B. Examine rough-in and built-in construction to verify actual locations of piping connections prior to installation.
C. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with referenced unit masonry standard and other requirements indicated applicable to each type of installation included in Project.
B. Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to the actual thickness of the masonry units, using units of nominal thickness indicated.
C. Build chases and recesses as shown or required to accommodate items specified in this and other Sections of the Specifications. Provide not less than 8 inches of masonry

between chase or recess and jamb of openings and between adjacent chases and recesses.

D. Leave openings for equipment to be installed before completion of masonry. After installation of equipment, complete masonry to match construction immediately adjacent to the opening.

E. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction. Use full-size units without cutting where possible.

F. Frozen Materials and Work: Do not use frozen materials mixed or coated with ice or frost. For masonry which is specified to be wetted, comply with the BIA recommendations. Do not build on frozen work. Remove and replace masonry work damaged by frost or freezing.

3.3 CONSTRUCTION TOLERANCES

A. Comply with construction tolerances of referenced unit masonry standard.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and for accurate locating of openings, movement-type joints, returns, and offsets. Avoid the use of less-than-half-size units at corners, jambs, and where possible at other locations.

B. Lay up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.

1. For the first and second block courses above and below apertures, run reinforcing continuous or extend two feet back from aperture edge. Refer to notes on Structural drawings.

C. Lay-up walls plumb and true and with courses level, accurately spaced and coordinated with other work. Do not wedge partitions tight against structural ceiling or beams, but provide a caulk or insulation filled joint between top of masonry and the structural roof deck, structural steel framing or structural floor deck. Stop masonry a minimum of 1/2 inch from vertical, horizontal and sloped steel surfaces.

D. Stopping and Resuming Work: In each course, rack back 1/2-unit length for one-half running bond or 1/3-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly (if required), and remove loose masonry units and mortar prior to laying fresh masonry.

E. Built-In Work: As construction progresses, build-in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.

1. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.
2. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.
3. Fill cores in hollow concrete masonry units with grout 3 courses (24 inches) under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.
4. Install adjustable hollow metal frame anchors, locating anchors on jambs in horizontal bed courses near the top and bottom of each frame and at intermediate points not over 24 inches apart.
5. Fill jambs and heads of all hollow metal door and window frames installed in CMU or concrete walls solid with grout.

6. Rake joints around exterior side of exterior hollow metal door frames for sealant under Division 7.
7. Where hollow metal frames do not wrap around masonry jambs and heads, rub exposed corners of block to remove sharp, irregular edges.

F. Intersecting Masonry Walls: Where interior nonload-bearing masonry partition or wall intersects an exterior or interior load-bearing masonry wall at 90 degrees, stop horizontal joint reinforcing in interior partition 4 inches short of intersection. Horizontal joint reinforcing in exterior or interior load-bearing wall shall run continuous. In the same courses as horizontal reinforcing, install wire mesh extending 8 inches minimum into interior partition and projecting into the exterior wall to within 2 inches of exterior face of wall. Install wire mesh reinforcing in horizontal joints 16 inches o.c. vertically.

G. Intersecting Masonry Walls: Where interior CMU walls intersect other CMU walls located in all Cells and areas accessible to inmates, or jail population, all intersecting walls shall be of "toothed" construction. Interlock every other course by "toothing" every other course.

H. Grout masonry walls where indicated on drawings.

3.5 MORTAR BEDDING AND JOINTING

A. Mix mortar ingredients for a minimum of 5 minutes in a mechanical batch mixer. Use water clear and free of deleterious materials which would impair the work. Each mortar batch is allowed only one retempering. Do not use mortar which has begun to set after the first re-tempering or if more than 2-1/2 hours has elapsed since initial mixing.

B. Lay solid masonry units with completely filled bed and head joint; butter ends with sufficient mortar to fill head joints and shove into place. Butter ends of brick in hand and in the wall at closures. Do not slush head joints.

C. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells; also bed webs in mortar in starting course on footings and foundation walls and in all courses of piers, columns and pilasters, and where adjacent to cells or cavities to be reinforced or to be filled with concrete or grout.

D. Joints: Maintain joint widths shown, except for minor variations required, to maintain joint alignment. Lay walls with 3/8-inch joints. Cut joints flush for masonry walls which are to be concealed or to be covered by other materials. For exposed masonry, provide joints as follows:
1. All Exposed Joints: Concave tooled.
2. All Concealed Joints: Struck flush.

E. Remove masonry units disturbed after laying; clean and relay in fresh mortar. Do not pound corners at jams to fit stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar, and reset in fresh mortar.

3.6 HORIZONTAL JOINT REINFORCEMENT

A. Provide continuous horizontal joint reinforcing as shown and specified. Fully embed longitudinal side rods in mortar for their entire length with a minimum cover of 5/8 inch on exterior side of walls and 1/2 inch at other locations. Lap reinforcement a minimum of 6 inches at ends of units. Do not bridge control and expansion joints with reinforcing.

B. Space continuous horizontal reinforcing as specified in Section 040523.

C. Reinforce masonry openings greater than 1 foot wide, with horizontal joint reinforcing

placed in 2 horizontal joints approximately 8 inches apart, both immediately above the lintel and immediately below the sill. Extend reinforcing a minimum of 2 foot beyond jambs of the opening except at control joints.

D. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

E. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.7 ANCHORING MASONRY TO STRUCTURAL MEMBERS

A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:

1. Provide an open space not less than 1 inch in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar or other rigid materials.
2. Anchor masonry to structural members with flexible 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.

3.8 ANCHORING SINGLE-WYTHE MASONRY VENEER

A. Anchor single-wythe masonry veneer to metal studs with masonry veneer anchors to comply with the following requirements:

1. Fasten each anchor section through sheathing to metal studs with 2 metal fasteners of type indicated.
2. Embed tie section in masonry joints. Provide not less than 2-inch air space between back of masonry veneer wythe and face of sheathing.
3. Locate anchor section relative to course in which tie section is embedded to allow maximum vertical differential movement of tie up and down.
4. Space anchors as indicated but not more than 16 inches o.c. vertically and 16 inches o.c. horizontally with not less than one anchor for each 2 sq. ft. of wall area. Install additional anchors within 1'-0" of openings and at intervals around perimeter not exceeding 8 inches.

B. Install vents at the top of each continuous air space in masonry veneer walls.

3.9 MOVEMENT (CONTROL AND EXPANSION) JOINTS

A. Install control and expansion joints in unit masonry where indicated, or if not indicated, space at a maximum of 1 1/2 times the wall height not to exceed 25’ o.c. Build in related items as the masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.

B. Form control joints in concrete masonry as follows:

1. Fit bond breaker strips into hollow contour in ends of block units on one side of control joint. Fill the resultant core with grout and rake joints in exposed faces.
2. Install preformed control joint gaskets designed to fit standard sash block.
3. Install special shapes designed for control joints. Install bond breaker strips at joint. Keep head joints free and clear of mortar or rake joint.

C. Build in horizontal pressure-relieving joints where indicated; construct joints by either

leaving an air space or inserting nonmetallic 50 percent compressible joint filler of width required to permit installation of sealant and backer rod specified in Division 7 Section "Joint Sealers."

1. Locate horizontal pressure-relieving joints beneath shelf angles supporting masonry veneer and attached to structure behind masonry veneer.

D. Control Joint Locations: If control joints are not shown on the Drawings, provide as follows:
1. Not to exceed 25 feet between joints in CMU walls, unless otherwise noted.
2. At change from wall setting on foundation to wall setting on floor slab.
3. At change from exterior wall to interior wall.
4. At walls setting on floors, that cross floor construction and control joints.
5. At columns within masonry walls.
6. At changes in wall thickness.

E. Column Isolation from Masonry: Continuously wrap steel columns or structural supports within masonry walls with 3/8-inch expansion joint filler sheets (column isolation). Secure with light gage wire. Refer to Section 04 05 23 for column isolation specifications.

3.10 LINTELS

A. Install steel lintels where indicated and/or as required for masonry openings.

B. Provide masonry lintels where shown and wherever openings of more than 1'-0" for brick size units and 2'-0" for block size units are shown without structural steel or other supporting lintels. Provide formed-in-place masonry lintels. Temporarily support formed-in-place lintels.
1. For hollow concrete masonry unit walls, use specially formed bond beam units with reinforcement bars placed as indicated and filled with coarse grout.

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

D. For all openings in non-load bearing CMU or brick, with lintels not shown on Structural Drawings, provide the following lintels:
1. CMU Lintel: Use bond beam lintel block. Fill with concrete or grout. All lintel block shall be 8” nominal height by the wall thickness. Extend lintel 24” into wall on each side of opening. Concrete or grout shall have a minimum of f’c = 4000 psi. Provide 2 - #5 rebar top and bottom. Lintel shall be shored in the center for 28 days. Maximum lintel clear span = 10’-0”.

3.11 INSTALLATION OF REINFORCED UNIT MASONRY

A. Install reinforced unit masonry to comply with requirements of referenced unit masonry standard.

B. Temporary Formwork: Construct formwork and shores to support reinforced masonry elements during construction.
1. Construct formwork to conform to shape, line, and dimensions shown. Make 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.

C. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.

D. Do not remove forms and shores until reinforced masonry members have hardened

sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

3.12 GROUTED FOUNDATION WALLS

A. Where concrete masonry foundations are required by the Drawings, reinforcing and grouting shall be completed within 72 hours after the completion of the wall and prior to backfilling on either side of the foundation wall.

3.13 VERTICAL REINFORCED CONCRETE MASONRY

A. Where grout filled or steel reinforced concrete block masonry foundations or masonry walls are called for on the Drawings, they shall be reinforced and grouted in accordance with the Drawings and details. All cells to be grouted shall be clean and free of mortar protrusions and droppings in the cells.

B. The low-lift grouting procedure shall be used as described in the Drawings and in NCMA-TEK 23A Grouting for Masonry Walls. Maximum height of grouting shall be 5 feet.

C. Grout to completely fill each cavity with homogenous grout, extending from the lowest course to the top of the reinforced portion of the foundation or wall. Concrete or mortar shall not be used as grout for CMU.

1. Aggregate used in the grout shall be small enough not to interfere with placement and plasticity.

D. After the grout is placed, it shall be consolidated with a small vibrator. The top of the grout filling shall be stopped 1-1/2 inches below the top of the concrete block, except for the top course in the wall where the grout shall be struck flush with the top. If highly absorptive masonry units are used, the grout shall be re-vibrated after it has begun to stiffen.

E. Caging devices and centering clips shall be spaced vertically such that every section of vertical reinforcing steel bar is restrained by 2 clips or devices, one near its top and one near its bottom.

3.14 ANCHORING MASONRY WORK

A. Provide anchoring devices of the type shown and as specified.

B. Anchor masonry to structural members where masonry abuts or faces such members to comply with the following:

1. Provide an open space not less than 1/2-inch width between masonry and structural member, unless other types of anchoring devices are shown. Keep open space free of mortar or other rigid materials.
2. Anchor masonry to structural members with metal ties embedded in masonry joints and attached to structure. Provide anchors with flexible tie sections, unless other types of anchoring devices are shown.
3. Space anchors as shown, but not more than 16 inches o.c. vertically and 24 inches o.c. horizontally.
4. The ends of wall ties shall be embedded in mortar joints. Wall tie ends shall engage outer face shells of hollow units by at least 1/2 inch. Wire wall ties shall be embedded at least 1-1/2 inch into the mortar bed of solid masonry units or solid grouted hollow units.
5. Unless otherwise required, wythes not bonded by headers shall be bonded with wall ties as follows:

a. Size - Minimum number of ties required
b. #9 gage - One wall tie wire per 2.67 sq.ft.
c. 3/16-inch diameter - One wall tie wire per 4.50 sq.ft.

6. Unless accepted by the Architect/Engineer, reinforcement shall not be bent after being embedded in grout or mortar.
7. Unless otherwise required adjustable ties shall meet the following requirements:

a. Use one tie for each 1.77 sq.ft. of wall area.
b. Neither horizontal nor vertical spacing shall exceed 16 inches.
c. Maximum misalignment of bed joints from one wythe to the other shall be 1-1/4 inch.
d. Maximum clearance between connecting parts of the ties shall be 1/16 inch.

3.15 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units. Install new units to match adjoining units and in fresh mortar or grout, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point-up all joints including corners, openings, and adjacent construction to provide a neat, uniform appearance, prepared for application of sealants.

C. 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 sample wall panel; leave 1/2 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, polyethylene film, or waterproof masking tape.
4. Wet wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
5. Clean concrete masonry by means of cleaning method indicated in NCMA TEK 8-2A applicable to type of stain present on exposed surfaces.
6. Clean all exposed concrete masonry of efflorescence in strict accordance with NCMA TEK 8-3A.

D. Protection: Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure unit masonry is without damage and deterioration at time of Substantial Completion.

END OF SECTION 042200

SECTION 044313.16 - ADHERED STONE MASONRY VENEER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Stone masonry adhered to concrete backup.
2. Stone masonry adhered to unit masonry backup.
3. Stone masonry adhered to wood framing and sheathing.
4. Stone masonry adhered to cold-formed metal framing and sheathing.

B. Related Requirements:

1. Section 042000 "Unit Masonry" for concealed flashing.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each variety of stone, stone accessory, and manufactured product.

B. Samples for Initial Selection: For colored mortar and other items involving color selection.

C. Samples for Verification:

1. For each stone type indicated. Include at least three Samples in each set, and show the full range of color and other visual characteristics in completed Work.
2. For each color of mortar required. Label Samples to indicate types and amounts of pigments used.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, supply sources, and other information as required to identify materials used. Include mix proportions for mortar and source of aggregates.

1. Neither receipt of list nor approval of mockups constitutes approval of deviations from the Contract Documents contained in mockups unless Architect approves such deviations in writing.

C. Material Test Reports:

1. Stone Test Reports: For each stone variety proposed for use on Project, by a qualified testing agency, indicating compliance with required physical properties, other than abrasion resistance, according to referenced ASTM standards. Base reports on testing done within previous five years.
2. Sealant Compatibility and Adhesion Test Report: From sealant manufacturer, indicating that sealants will not stain or damage stone. Include interpretation of test results and recommendations for primers and substrate preparation needed for adhesion.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs experienced stonemasons and stone fitters.

B. Mockups: Build mockups 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. Build mockups for each type of stone masonry and typical exterior wall in sizes approximately 72 inches (1800 mm) long by 72 inches (1800 mm) high by full thickness, including face and backup construction and accessories.

a. Include stone coping at top of mockup.
b. Include a sealant-filled joint at least 16 inches (400 mm) long in mockup.
c. Include through-wall flashing installed for a 24-inch (600-mm) length in corner of mockup approximately 16 inches (400 mm) down from top of mockup, with a 12-inch (300-mm) length of flashing left exposed to view (omit stone masonry above half of flashing).
d. Include studs, sheathing, building paper or wrap, drainage material, and flashing in exterior masonry-veneer wall mockup.

3. Protect accepted mockups from the elements with weather-resistant membrane.
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 may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 PRECONSTRUCTION TESTING

A. Preconstruction Sealant Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for compatibility and adhesion testing according to sealant manufacturer's standard testing methods and Section 079200 "Joint Sealants," Samples of materials that will contact or affect joint sealants.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

B. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

C. 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, in a dry location, or in covered weatherproof dispensing silos.

1.9 FIELD CONDITIONS

A. Protection of Stone Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed stone masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches (600 mm) down both sides, and hold cover securely in place.

B. Stain Prevention: Immediately remove mortar and soil to prevent them from staining stone masonry face.

1. Protect base of walls from rain-splashed mud and mortar splatter, using coverings spread on the ground and over the 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 end of each day to prevent rain from splashing mortar and dirt on completed stone masonry.

C. 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 stone masonry damaged by frost or 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 (4 deg C) and above and will remain so until masonry has dried, but not less than seven days after completing cleaning.

D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

1.10 COORDINATION

A. Advise installers of other work about specific requirements for placement of flashing and similar items to be built into stone masonry.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Stone: Obtain stone,from single manufacturer, whether specified in this Section or in another Section of the Specifications, with resources to provide materials of consistent quality in appearance and physical properties.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of uniform quality for each cementitious component from single manufacturer and each aggregate from single source or producer.

2.2 OTHER STONE

A. Material Standards:

1. Maximum Absorption according to ASTM C97/C97M: 7.5 percent.
2. Minimum Compressive Strength according to ASTM C170/C170M: 4000 psi (28 MPa).

B. Varieties and Sources: Subject to compliance with requirements, provide the following:

1. Eldorado Stone, Mountain Ledge Non-Panel Series, Color: Yukon.

C. Match Architect's samples for color, finish, and other stone characteristics relating to aesthetic effects.

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; natural color or white cement may be used as required to produce mortar color indicated.

1. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C114.

B. Hydrated Lime: ASTM C207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

    a. CEMEX.
    b. Lafarge North America Inc.
    c. Quikrete.
    d. Sakrete.
    e. Titan America.

D. Mortar Cement: ASTM C1329/C1329M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. CEMEX.
    b. Lafarge North America Inc.
    c. Quikrete.
    d. Sakrete.
    e. Titan America.

E. Masonry Cement: ASTM C91/C91M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Cemex S.A.B. de C.V.
    b. Lafarge North America Inc.
    c. Quikrete.
    d. Sakrete.
    e. Titan America.

F. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C979/C979M. Use only pigments with a record of satisfactory performance in stone masonry mortar.

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. Davis Colors.
    b. Euclid Chemical Company (The); an RPM company.
    c. Solomon Colors Inc.

G. Colored Portland Cement-Lime Mix: Packaged blend of portland cement, hydrated lime, and mortar pigments. Mix shall produce color indicated or, if not indicated, as selected from manufacturer's standard colors. Pigments shall not exceed 10 percent of portland cement by weight.

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. Lafarge North America Inc.
b. Laticrete International, Inc.

H. Colored Masonry Cement Mix: Packaged blend of masonry cement and mortar pigments. Mix shall produce color indicated or, if not indicated, as selected from manufacturer's standard colors. Pigments shall not exceed 5 percent of masonry cement by weight.

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. Cemex S.A.B. de C.V.
b. Lafarge North America Inc.
c. Laticrete International, Inc.
d. National Cement Company, Inc.

I. Aggregate: ASTM C144 and as follows:

1. For pointing mortar, use aggregate graded with 100 percent passing No. 16 (1.18-mm) sieve.
2. White Aggregates: Natural white sand or ground white stone.
3. Colored Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.

a. Match Architect's sample.

J. Latex Additive: Manufacturer's standard Acrylic-resin or styrene-butadiene-rubber water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement mortar bed, and not containing a retarder.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Laticrete International, Inc.
b. MAPEI Corporation.
c. Quikrete.
d. Sakrete; CRH Americas, Oldcastle APG.
e. Sika.

K. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494/C494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Euclid Chemical Company (The); an RPM company.
b. GCP Applied Technologies Inc.

L. Water: Potable.

2.4 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing, where flashing is exposed or partly exposed and where indicated, complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:

1. Stainless Steel: ASTM A240/A240M, Type 304, 0.016 inch (0.4 mm) thick.
2. Fabricate continuous flashings in sections 96 inches (2400 mm) long minimum, but not exceeding 12 feet (3.6 m). Provide splice plates at joints of formed, smooth metal flashing.
3. Fabricate through-wall metal flashing embedded in masonry from stainless steel, with ribs at 3-inch (75-mm) intervals along length of flashing to provide an integral mortar bond.

    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) Cheney Flashing Company.
        2) Hohmann & Barnard, Inc.
        3) Keystone Flashing Company, Inc.

4. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.
5. Fabricate through-wall flashing with drip edge unless otherwise indicated. Fabricate by extending flashing 1/2 inch (13 mm) out from wall, with outer edge bent down 30 degrees and hemmed.
6. Fabricate through-wall flashing with sealant stop where indicated. Fabricate by bending metal back on itself 3/4 inch (19 mm) at exterior wall face and down into joint 3/8 inch (10 mm) to form a stop for retaining sealant backer rod.
7. Fabricate metal drip edges and sealant stops for ribbed metal flashing from plain metal flashing of same metal as ribbed flashing and extending at least 3 inches (75 mm) into wall with hemmed inner edge to receive ribbed flashing and form a hooked seam. Form hem on upper surface of metal, so that completed seam will shed water.
8. Metal Drip Edges: Fabricate from stainless steel. Extend at least 3 inches (75 mm) into wall and 1/2 inch (13 mm) out from wall, with outer edge bent down 30 degrees and hemmed.
9. Metal Sealant Stops: Fabricate from stainless steel. Extend at least 3 inches (75 mm) into wall and out to exterior wall face. At exterior wall face, bend metal back on itself for 3/4 inch (19 mm) and down into joint 3/8 inch (10 mm) to form a stop for retaining sealant backer rod.
10. Metal Expansion-Joint Strips: Fabricate from stainless steel to shapes indicated.

B. Flexible Flashing: For flashing unexposed to the exterior, use one of the following unless otherwise indicated:

1. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive, rubberized-asphalt compound, bonded to a high-density, cross-laminated, polyethylene film to produce an overall thickness of not less than 0.040 inch (1.0 mm).

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) Carlisle Coatings & Waterproofing Inc.
2) GCP Applied Technologies Inc.

2. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy as follows:

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) DuPont de Nemours, Inc.
2) Hyload; IKO Industries, Inc.
3) Mortar Net Solutions.

b. Self-Adhesive Sheet with Drip Edge: Elastomeric thermoplastic flashing, 0.025 inch (0.64 mm) thick, with a 0.015-inch- (0.38-mm-) thick coating of rubberized-asphalt adhesive. Where flashing extends to masonry face, rubberized-asphalt coating is held back approximately 1-1/2 inches (38 mm) from edge.

1) Color: Manufacturer's standard.

c. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

3. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D4637/D4637M, 0.040 inch (1.0 mm) thick.

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) Carlisle Coatings & Waterproofing Inc.
2) Firestone Building Products.

C. Application: Unless otherwise indicated, use the following:

1. Where flashing is indicated to receive counterflashing, use metal flashing.
2. Where flashing is indicated to be turned down at or beyond wall face, use metal flashing.
3. Where flashing is partly exposed and is indicated to terminate at wall face, use metal flashing with a drip edge or flexible flashing with a metal drip edge or elastomeric thermoplastic flashing with drip edge or flexible flashing with a metal sealant stop.
4. Where flashing is fully concealed, use metal flashing or flexible flashing.

D. Solder and Sealants for Sheet Metal Flashings: As specified in Section 076200 "Sheet Metal Flashing and Trim."

E. Adhesives, Primers, and Seam Tapes for Flexible Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.5 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene urethane or PVC.

B. Cementitious Dampproofing: Cementitious formulation recommended by ILI and nonstaining to stone, compatible with joint sealants, and noncorrosive to veneer anchors and attachments.

C. Weep Products: Use the following unless otherwise indicated:

1. Wicking Material: Absorbent rope, made from UV-resistant synthetic fiber, 1/4 to 3/8 inch (6 to 10 mm) in diameter.

D. Expanded Metal Lath: 3.4 lb/sq. yd. (1.8 kg/sq. m), self-furring, diamond-mesh lath complying with ASTM C847. Fabricate from structural-quality, zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G60 (Z180).

E. Lath Attachment Devices: Material and type required by ASTM C1063 for installations indicated.

2.6 MASONRY CLEANERS

A. Acidic Cleaners shall not be used on applied stone. Refer to manufacturers instructions on cleaning with a 5:1 water/vinegar solution and medium plastic brush.

2.7 FABRICATION

A. General: Fabricate stone units in sizes and shapes required to comply with requirements indicated.

B. Dress joints (bed and vertical) straight and at right angle to face unless otherwise indicated. Shape beds to fit supports.

C. Finish exposed stone faces and edges to comply with requirements indicated for finish and to match approved samples and mockups.

1. Finish: Split face.
2. Finish for Sills: Sand rubbed.
3. Finish for Lintels: Sand rubbed.
4. Finish for Copings: Sand rubbed.

a. Finish exposed ends of copings same as front and back faces.

2.8 MORTAR MIXES

A. Manufacturer’s recommendations for mortar mixes shall take precedence over the following requirements unless no information is available from manufacturer or their representative.

B. 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.
2. Use portland cement-lime masonry cement or mortar cement 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.
4. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding water. Then mix again, adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for one to two hours. Add remaining water in small portions until mortar reaches required consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.

C. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in the form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

D. Mortar for Stone Masonry: Comply with ASTM C270, Proportion Specification.

1. Mortar for Setting Stone: Type N.
2. Mortar for Pointing Stone: Type N.

E. Latex-Modified Portland Cement Setting Mortar: Proportion and mix portland cement, aggregate, and latex additive to comply with latex-additive manufacturer's written instructions.

F. Cement-Paste Bond Coat: Mix either neat cement and water or cement, sand, and water to a consistency similar to that of thick cream.

1. For latex-modified portland cement, setting-bed mortar, substitute latex admixture for part or all of water, according to latex-additive manufacturer's written instructions.

G. Mortar for Scratch Coat over Metal Lath: 1 part portland cement, 1/2 part lime, 5 parts loose damp sand, and enough water to produce a workable consistency.

H. Mortar for Scratch Coat over Unit Masonry: 1 part portland cement, 1 part lime, 7 parts loose damp sand, and enough water to produce a workable consistency.

I. 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. Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight.
3. Mix to match Architect's sample.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces indicated to receive stone masonry, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of stone masonry.

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

3.2 PREPARATION

A. Clean dirty or stained stone surfaces by removing soil, stains, and foreign materials before setting. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.

3.3 SETTING STONE MASONRY

A. Perform necessary field cutting and trimming as stone is set.

1. Use power saws to cut stone that is fabricated with saw-cut surfaces. Cut lines straight and true, with edges eased slightly to prevent snipping.
2. Use hammer and chisel to split stone that is fabricated with split surfaces. Make edges straight and true, matching similar surfaces that were shop or quarry fabricated.
3. Pitch face at field-split edges as needed to match stones that are not field split.

B. Sort stone before it is placed in wall to remove stone that does not comply with requirements relating to aesthetic effects, physical properties, or fabrication, or that is otherwise unsuitable for intended use.

C. Arrange stones to match manufacturer’s standard pattern.

D. Arrange stones with color and size variations uniformly dispersed for an evenly blended appearance.

E. Set stone to comply with requirements indicated on Drawings. Install supports, fasteners, and other attachments indicated or necessary to secure stone masonry in place. Set stone accurately in locations indicated, with edges and faces aligned according to established relationships and indicated tolerances.

F. Maintain uniform joint widths, except for variations due to different stone sizes and where minor variations are required to maintain bond alignment if any. Lay walls with joints not less than 1/4 inch (6 mm) at narrowest points or more than 3/8 inch (10 mm) at widest points.

G. Provide sealant joints of widths and at locations indicated.

1. Keep sealant joints free of mortar and other rigid materials.
2. Sealing joints are specified in Section 079200 "Joint Sealants."

H. Install embedded flashing and weep holes at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

1. At stud-framed walls, extend flashing through stone masonry, up sheathing face at least 8 inches (200 mm), and behind weather barrier.
2. At multiwythe masonry walls, extend flashing through stone masonry, turned up a minimum of 8 inches (200 mm), and extend into or through inner wythe to comply with requirements in Section 042000 "Unit Masonry."
3. At concrete backing, extend flashing through stone masonry, turned up a minimum of 6 inches (150 mm), and insert in reglet. Reglets are specified in Section 076200 "Sheet Metal Flashing and Trim."
4. At lintels and shelf angles, extend flashing full length of angles but not less than 6 inches (150 mm) into masonry at each end.
5. At sills, extend flashing not less than 4 inches (100 mm) at ends.
6. At ends of head and sill flashing, turn up not less than 2 inches (50 mm) to form end dams.
7. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches (38 mm) or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
8. Install metal drip edges and sealant stops with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
9. Extend sheet metal flashing 1/2 inch (13 mm) beyond masonry face at exterior, and turn flashing down to form a drip.
10. Install metal drip edges beneath flexible flashing at exterior wall face. Stop flexible flashing 1/2 inch (13 mm) back from exterior wall face, and adhere flexible flashing to top of metal drip edge.
11. Install metal flashing termination beneath flexible flashing at exterior wall face. Stop flexible flashing 1/2 inch (13 mm) back from exterior wall face, and adhere flexible flashing to top of metal flashing termination.
12. Cut flexible flashing flush with wall face after completing masonry wall construction.

I. Place weep holes in joints where moisture may accumulate, including above shelf angles and at flashing.

1. Use wicking material mesh weep holes or open head joints to form weep holes.
2. Use wicking material to form weep holes above flashing in stone sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
3. Space weep holes 16 inches (400 mm) o.c.
4. Trim wicking material used in weep holes flush with exterior wall face after mortar has set.

3.4 CONSTRUCTION TOLERANCES

A. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (10 mm in 6 m), or 1/2 inch in 40 feet (13 mm in 12 m) or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet (6 mm in 6 m) or 1/2 inch in 40 feet (13 mm in 12 m) or more.

B. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 1/4 inch in 20 feet (6 mm in 6 m) or 1/2 inch in 40 feet (13 mm in 12 m) or more.

C. Variation of Linear Building Line: For position shown in plan, do not exceed 1/2 inch in 20 feet (13 mm in 6 m) or 3/4 inch in 40 feet (19 mm in 12 m) or more.

D. Measure variation from level, plumb, and position shown in plan as a variation of the average plane of each stone face from level, plumb, or dimensioned plane.

E. Variation in Mortar-Joint Thickness: Do not vary from joint size range indicated.

F. Variation in Plane between Adjacent Stones: Do not exceed one-half of tolerance specified for thickness of stone.

3.5 INSTALLATION OF ADHERED STONE MASONRY VENEER

A. Refer to wall sections for assembly layers then install per instructions below.

B. Install flashing over sheathing and behind building paper or wrap and drainage material by fastening through sheathing into framing.

C. Install lath over building paper or wrap and drainage material by fastening through sheathing into framing to comply with ASTM C1063.

D. Install lath over unit masonry and concrete to comply with ASTM C1063.

E. Install scratch coat over metal lath 3/8 inch (10 mm) thick to comply with ASTM C926.

F. Coat backs of stone units and face of scratch coat /masonry backup with cement-paste bond coat, then butter both surfaces with setting mortar. Use sufficient setting mortar, so a slight excess will be forced out the edges of stone units as they are set. Tap units into place, completely filling space between units and scratch coat /masonry backup.

G. Rake out joints for pointing with mortar to depth of not less than 3/4 inch (19 mm) before setting mortar has hardened. Rake joints to uniform depths with square bottoms and clean sides.

3.6 POINTING

A. Prepare stone-joint surfaces for pointing with mortar by removing dust and mortar particles. Where setting mortar was removed to depths greater than surrounding areas, apply pointing mortar in layers not more than 3/8 inch (10 mm) deep until a uniform depth is formed.

B. Point stone joints by placing and compacting pointing mortar in layers of not more than 3/8 inch (10 mm) deep. Compact each layer thoroughly, and allow to it become thumbprint hard before applying next layer.

C. Tool joints, when pointing mortar is thumbprint hard, with a smooth jointing tool to produce the following joint profile:

1. Joint Profile: Concave.

3.7 ADJUSTING AND CLEANING

A. Remove and replace stone masonry of the following description:

1. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are approved by Architect.
2. Defective joints.
3. Stone masonry not matching approved samples and mockups.
4. Stone masonry not complying with other requirements indicated.

B. Replace in a manner that results in stone masonry matching approved samples and mockups, complying with other requirements, and showing no evidence of replacement.

C. In-Progress Cleaning: Clean stone masonry as work progresses. Remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean stone 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; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before cleaning stone masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
4. Wet wall surfaces with water before applying cleaner; remove cleaner promptly by rinsing thoroughly with clear water.
5. Clean stone masonry per manufacturer’s recommendations.

3.8 EXCESS MATERIALS AND WASTE

A. Excess Stone: Stack excess stone where directed by Owner for Owner's use.

B. Disposal as Fill Material: Dispose of clean masonry waste, including mortar and excess or soil-contaminated sand, by crushing and mixing with fill material as fill is placed.

1. Crush masonry waste to less than 4 inches (100 mm) in greatest dimension.
2. Mix masonry waste with at least 2 parts of specified fill material for each part of masonry waste. Fill material is specified in Section 312000 "Earth Moving."
3. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.

C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other waste, and legally dispose of off Owner's property.

END OF SECTION 044313.16

SECTION 061000
ROUGH CARPENTRY

PART 1 GENERAL

1.01 COORDINATION

A. Coordinate with structural specifications on structural drawings. Notify the Structural Engineer and the Architect of any conflict.

1.02 RELATED DOCUMENTS

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

B. General Contractor shall be responsible for assuring that all carpentry work not included in other sections is included here-in and that there are no exclusions that are otherwise not covered.

1.03 SUMMARY

A. This Section includes the following:

1. Framing with dimension lumber.
2. Framing with engineered wood products.
3. Wood grounds, nailers, blocking, and rooftop curb support.
4. Sheathing.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 6 Section "Prefabricated Metal-Plate-Connected Wood Trusses."

1.04 DEFINITIONS

A. Rough carpentry includes carpentry work not specified as part of other Sections and generally not exposed, unless otherwise specified.

1.05 SUBMITTALS

A. General: submit the following perh Conditions of Contract and Division 1 Specification Sections.

B. Product data for the following products:
1. Metal framing anchors.

C. Material certificates for dimensional lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use as well as design values approved by the Board of Review of American Lumber Standards Committee.

D. Wood treatment data as follows including chemical treatment manufacturer's instructions for handling, storing, installation, and finishing of treated material:

1. Each type of preservative treated wood product include certification by treating plant stating type of

preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.
2. Water-borne treated products include statement that moisture content of treated materials was reduced to levels indicated prior to shipment to project site.
3. Exposed rough timbers certification that treatment is compatible with exterior paint or stain finishes.

1.06 QUALITY ASSURANCE

A. Single-Source Responsibility for Engineered Wood Products: obtain each type of engineered wood products from one source from a single manufacturer.

1.07 DELIVERY, STORAGE, & HANDLING

A. Delivery and Storage: keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels; provide for air circulation within and around stacks and under temporary coverings including polyethylene and similar materials.

1. Lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

PART 2 PRODUCTS

2.01 LUMBER, GENERAL

A. Lumber Standards: furnish lumber manufactured to comply with PS 20 "American Softwood Lumber Standard" and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.

B. Inspection Agencies: Inspection agencies and the abbreviations used to reference them with lumber grades and species include the following:

1. WCLIB: West Coast Lumber Inspection Bureau.
2. SPIB: Southern Pine Inspection Bureau
3. SFPA: Southern Forest Products Association
4. WWPA: Western Wood Products Association

C. Grade Stamps: provide lumber with each piece factory-marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

1. Exposed lumber furnish pieces with grade stamps applied to ends or back of each piece.

D. Nominal sizes are indicated, except as shown by detail dimensions. Provide actual sizes as required by PS 20, for moisture content specified for each use.

1. Provide seasoned lumber with 19% maximum moisture content at time of dressing and shipment for sizes 2 inches or less in nominal thickness, unless otherwise indicated.
2. Provide dressed lumber, S4S, unless otherwise indicated.

2.02 DIMENSION LUMBER

A. Structural light framing (2 to 4 inches thick, 2 to 12 inches wide), provide grade and species as specified on the structural drawings.

2.03 MISCELLANEOUS LUMBER

A. General: provide lumber for support or attachment of other construction including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.

B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.

C. Moisture content: 19% maximum for lumber items not specified to receive wood preservative treatment.

D. Grade: "Standard" grade light-framing-size lumber of any species or board-size lumber as required. "No. 3 Common" or "Standard" grade boards per WCLIB or WWPA rules or "No. 2 Boards" per SPIB rules.

2.04 ENGINEERED WOOD PRODUCTS (See Structural Drawings for Application)

A. General: provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that evidence compliance with building code in effect for Project.
   1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer meeting/exceeding those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis, and demonstrated by comprehensive testing performed by a qualified independent testing agency.

B. Laminated-Veneer Lumber: lumber manufactured by laminating wood veneers in a continuous press using an exterior-type adhesive complying with ASTM D 2559 to produce members with grain of veneers parallel to their lengths and complying with the following requirements:

   1. Extreme Fiber Stress in Bending: 2600 psi for 12-inch nominal depth members.
   2. Modulus of Elasticity: 1,900,000 psi.
   3. Tension Parallel to Grain: 1850 psi.
   4. Compression Parallel to Grain: 2510 psi.
   5. Compression Perpendicular to Grain: 400 psi perpendicular to & 750 psi parallel to glue line.
   6. Horizontal Shear: 285 psi perpendicular to and 190 psi parallel to glue line.

C. Parallel-Strand Lumber: lumber manufactured by laying up wood strands using an exterior-type adhesive complying with ASTM D 2559, and cured under pressure to produce members with grain of strands parallel to their lengths and complying with the following requirements:

   1. Extreme Fiber Stress in Bending: 2900 psi 12-inch nominal depth members.
   2. Modulus of Elasticity: 2,000,000 psi.
   3. Tension Parallel to Grain: 2400 psi.
   4. Compression Parallel to Grain: 2900 psi.
   5. Compression Perpendicular to Grain: 400 psi perpendicular to and 750 psi and parallel to wide face of strands.
   6. Horizontal Shear: 290 psi perpendicular to and 290 psi parallel to wide face of strands.

D. Prefabricated Wood I-Joists: units manufactured by bonding stress-graded lumber flanges to wood-based

structural-use panel webs with exterior-type adhesives complying with ASTM D 2559, to produce I-shaped joists complying with the following requirements:

1. Flange Material: laminated-veneer lumber.
2. Flange Material: southern pine dimension lumber.
3. Flange Material: any material indicated above, as standard with joist manufacturer.
4. Web Material: Oriented-strand board (OSB) complying with DOC PS 2.
5. Web Material: plywood complying with DOC PS 2.
6. Web Material: either material indicated above, as standard with joist manufacturer.
7. Structural Capacities: establish and monitor structural capacities according to ASTM D 5055.
8. Sizes: depths and widths as indicated, with flanges not less than 1½ inches in actual width.

2.05 CONSTRUCTION PANELS, GENERAL

A. Construction Panel Standards: comply with PS 1 "U.S. Product Standard for Construction and Industrial Plywood" for plywood construction panels and, for products not manufactured under PS 1 provisions, with APA PRP-108.

B. Trademark: furnish construction panels that are each factory- marked with APA trademark evidencing compliance with grade requirements.

2.06 CONCEALED PERFORMANCE-RATED CONSTRUCTION PANELS

A. General: where construction panels indicated for the following concealed types of applications, provide APA Performance-Rated Panels complying with requirements designated under each application for grade designation, span rating, exposure durability classification, edge detail (where applicable), and thickness.

B. Wall Sheathing: APA RATED SHEATHING.

1. Exposure Durability Classification: EXPOSURE 1.
2. Span Rating: 24 or Wall 24 on center or better.

C. Roof Sheathing: APA RATED SHEATHING.

1. Exposure Durability Classification: EXPOSURE 1.
2. Span Rating: 24/0, or better.

D. Subfloor: APA rated Sturd-I-Floor

1. Exposure durability classification: Exposure I
2. Span rating: single floor - 24
3. Edge detail: tongue and Groove

E. Structural-Use Panels for Backing:

1. Plywood Backing Panels: mounting electrical or telephone equipment, provide fire-retardant-treated plywood panels with grade, C-D Plugged Exposure 1, in thickness indicated or, if not otherwise indicated, not less than 15/32 inch thick.

2.07 FASTENERS

A. General: provide fasteners of size and type indicated that 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 a hot-dip zinc coating per ASTM A-153 or of AISI Type 304 stainless steel.

B. Nails, Wire, Brads, and Staples: FS FF-N-105.

C. Power Driven Fasteners: National Evaluation Report NER-272.

D. Wood Screws: ANSI B18.6.1.

E. Lag Bolts: ANSI B18.2.1.

F. Bolts: steel bolts per ASTM A-307, Grade A; with ASTM A-563 hex nuts & where indicated flat washers.

2.08 METAL FRAMING ANCHORS (See Structural Drawings for Type and Size)

A. General: provide metal framing anchors of type, size, metal, and finish indicated that comply with requirements specified including the following:

1. Current Evaluation/Research Reports: provide products for which model code evaluation/research reports exist that are acceptable to authorities having jurisdiction and that evidence compliance of metal framing anchors for application indicated with the building code in effect for this Project.
2. Allowable Design Loads: provide products for which manufacturer publishes allowable design loads that are determined from empirical data or by rational engineering analysis and that are demonstrated by comprehensive testing performed by a qualified independent testing laboratory.

B. Galvanized Steel Sheet: steel sheet zinc-coated by hot-dip process on continuous lines prior to fabrication per ASTM A 525 for Coating Designation G60 and with ASTM A 446, Grade A (structural quality); ASTM A 526 (commercial quality); or ASTM A 527 (lock-forming quality); as standard with manufacturer for type of anchor indicated.

1. Use galvanized steel framing anchors for rough carpentry exposed to weather, in ground contact, or in area of high relative humidity, and where indicated.

2.09 PRESERVATIVE WOOD TREATMENT BY PRESSURE PROCESS

A. General: where lumber or plywood is indicated as preservative- treated wood or is specified herein to be treated, comply with applicable requirements of AWPA Standards C2 (Lumber) and C9 (Plywood). Mark each treated item with the AWPB or SPIB Quality Mark Requirements.

B. Pressure-treat above-ground items with water-borne preservatives to a minimum retention of 0.25 pcf. For interior uses, after treatment, kiln-dry lumber and plywood to a maximum moisture content, respectively, of 19% and 15%. Treat indicated items 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 members less than 18 inches above grade.
4. Wood floor plates installed over concrete slabs directly in contact with earth.
5. Exterior exposed rough timber framing.

C. Pressure-treat wood members in contact with the ground or fresh water with water-borne preservatives to a minimum retention of 0.40 pcf.

D. Complete fabrication of treated items prior to treatment, where possible. If cut after treatment, coat cut surfaces to comply with AWPA M4. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

2.10 FIRE-RETARDANT-TREATED MATERIALS

A. General: where fire-retardant-treated wood is indicated, comply with applicable requirements of AWPA C20 (lumber) and AWPA C27 (plywood). Identify fire-retardant-treated wood with appropriate classification marking of UL; U.S. Testing; Timber Products Inspection, Inc.; or another testing and inspecting agency acceptable to authorities having jurisdiction.

1. Research or Evaluation Reports: provide fire-retardant-treated wood acceptable to authorities having jurisdiction and for which a current model code research or evaluation report exists that evidences compliance of fire-retardant-treated wood for application indicated.
2. For exposed items indicated to receive stained finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

B. Interior Type A: interior locations, use chemical formulation that produces treated lumber and plywood with the following properties under conditions present after installation:

1. Bending strength, stiffness, and fastener-holding capacities are not reduced below values published by manufacturer of chemical formulation under elevated temperature and humidity conditions simulating installed conditions when tested by a qualified independent testing agency.
2. No form of degradation occurs due to acid hydrolysis or other causes related to treatment.
3. Contact with treated wood does not promote corrosion of metal fasteners.

C. Exterior Type: use for exterior locations and where indicated.

D. Inspect each piece of treated lumber or plywood after drying and discard damaged or defective pieces.

2.11 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Framing: Formulation per APA AFG-01 that is approved for use with type of construction panel indicated by both adhesive and panel manufacturers.

PART 3 EXECTION

3.01 INSTALLATION, GENERAL

A. Discard units of material with defects that impair quality of rough carpentry construction and that are too small to use in fabricating rough carpentry with minimum joints or optimum joint arrangement.

B. Set rough carpentry to required levels and lines, with members plumb and true to line and cut and fitted.

C. Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.

D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. CABO NER - 272 for power-driven staples, P-nails, and allied fasteners.
2. Published requirements of metal framing anchor manufacturer.
3. "Recommended Nailing Schedule" of referenced framing standard and with AFPA's "National Design Specifications for Wood Construction".
4. "Table 2306.1 -- Fastening Schedule" of the Standard Building Code.

E. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; predrill as required.

F. Use hot-dip galvanized or stainless-steel nails where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity.

G. Countersink nail heads on exposed

3.02 WOOD GROUNDS, NAILERS, BLOCKING, & SLEEPERS

A. Install wood grounds, nailers, blocking, and sleepers where shown and where required for screeding or attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.

B. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.

C. Install permanent grounds of dressed, 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 involved. Remove temporary grounds when no longer required.

3.03 WOOD FRAMING, GENERAL

A. Framing Standard: comply with AFPA's "Manual for Wood Frame Construction," unless otherwise indicated.

B. Framing with Engineered Wood Products: install engineered wood products to comply with manufacturer's written instructions.

C. Install framing members of size and at spacing indicated.

D. Do not splice structural members between supports.

E. Firestop concealed spaces of wood-framed walls and partitions at each floor level and at ceiling line of

top story. Where firestopping is not inherent in framing system used, provide closely fitted wood blocks of 2 inch nominal thickness lumber of same width as framing members.

3.04 WALL & PARTITION FRAMING

A. General: arrange studs so that wide face of stud is perpendicular to direction of wall or partition and narrow face is parallel. Provide single bottom plate and double top plates using members of 2 inch nominal thickness whose widths equal that of studs; except single top plate may be used for non-load bearing partitions. Nail or anchor plates to supporting construction, unless otherwise indicated.

1. Exterior walls and interior load-bearing walls, stud size and spacing shall be as indicated on the Structural Drawings.
2. Interior non-bearing partitions provide 2 x 4 studs or 2 x 6 studs spaced at 16 inches on center as indicated on the Architectural Drawings.

B. Construct corners and intersections with 3 or more studs. Provide miscellaneous blocking and framing as shown and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide continuous horizontal blocking at mid height of single-story partitions over 96 inches high, using members of 2 inch nominal thickness and of same width as wall or partitions.

C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Set headers on edge and support on jamb studs.

1. For non-load-bearing partitions, provide double-jamb studs with headers not less than 4-inch nominal depth for openings 36 inches and less in width, and not less than 6-inch nominal depth for wider openings.
2. For load-bearing walls, provide double-jamb studs for openings 72 inches and less in width, and triple-jamb studs for wider openings. Provide headers of depth shown or, if not shown, as recommended by AFPA's "Manual for Wood Frame Construction."

D. Bracing in exterior walls is provided by plywood sheathing full-story height, applied vertically.

3.05 PREFABRICATED FLOOR JOIST FRAMING

A. General: Install floor joists with crown edge up and support ends of each member with not less than 1½ inches of bearing on wood or metal.

1. Where supported on wood members, by toe nailing or by using metal framing anchors.
2. Where framed into wood supporting members by using metal joist hangers

B. Frame openings with headers and trimmers supported by metal joist hangers. See Structural Drawings.

C. Under non-load-bearing partitions, provide additional joists or framing as indicated on the Structural Drawings.

3.06 RAFTER & CEILING JOIST FRAMING

A. Rafters: notch to fit exterior wall plates, toe nails or use special metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing (if any), and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge

hangers.

1. At valleys, install valley rafter of size shown, or if not shown, twice the thickness of regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against valley rafter.
2. At hips, install hip rafters of size shown, or if not shown, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against hip rafters.

B. Install collar beams (ties) as shown, or if not shown, install 1-inch by 6-inch boards between every third pair of rafters. Locate below ridge member, one-third of distance to ceiling joists. Cut ends to fit slope and nail to rafters.

C. Install special framing as shown for eaves, overhangs, dormers and similar conditions.

3.07 INSTALLATION OF CONSTRUCTION PANELS

A. General: comply with applicable recommendations contained in Form #E30, "APA Design/Construction Guide - Residential & Commercial," for types of construction panels and applications indicated.

B. Fastening Methods: fasten panels as indicated below:

1. Sheathing: nail to framing in accordance with nailing schedule on Structural Drawings.

END OF SECTION 061000

SECTION 061753

SHOP FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Triangular-pitched roof trusses.
2. Scissor roof trusses.
3. Parallel-chord roof trusses, top-chord bearing.
4. Parallel-chord roof trusses, bottom-chord bearing.
5. Girder trusses.
6. Parallel-chord floor trusses, top-chord bearing.
7. Parallel-chord floor trusses, bottom-chord bearing.
8. Truss accessories.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 5 Section "Metal Fabrications" for rough hardware anchoring trusses to concrete or masonry structures.
2. Division 6 Section "Rough Carpentry" for roof and floor sheathing of structural-use panels and dimension lumber for supplementary framing and permanent bracing.

1.3 DEFINITIONS

A. Metal-plate-connected wood trusses include planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance: Engineer, fabricate, and erect metal-plate-connected wood trusses to withstand design loads within limits and under conditions required.

1. Design Loads: As indicated.
2. Design trusses to withstand design loads without deflections greater than the following:

a. Roof Trusses: Vertical deflection of 1/240 of span due to total load.

b. Roof Trusses: Horizontal deflection at reactions of 1-1/4 inches (32 mm) due to total load.
c. Floor Trusses: Vertical deflection of 1/360 of span due to live load.

B. Engineering Responsibility: Engage a fabricator who uses a qualified professional engineer to prepare calculations, Shop Drawings, and other structural data for metal-plate-connected wood trusses.

1.5 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for lumber, metal-plate connectors, metal framing connectors, bolts, and fasteners.

C. Shop Drawings detailing loading, location, pitch, span, camber, configuration, and spacing for each type of truss required; species, sizes, and stress grades of lumber to be used; splice details; type, size, material, finish, design values, and orientation and location of metal connector plates; and bearing details.

1. To the extent truss design considerations are indicated as fabricator's responsibility, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
2. Include truss Shop Drawings signed and sealed by the qualified professional engineer responsible for their preparation.

D. Product certificates signed by officer of truss fabricating firm certifying that metal-plate-connected wood trusses supplied for Project comply with specified requirements and Shop Drawings.

E. Qualification data for firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

F. Material certificates for dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the American Lumber Standards Committee (ALSC) Board of Review.

G. Research or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence the following products' compliance with building code in effect for Project.

1. Metal-plate connectors.
2. Metal framing connectors.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed wood truss installation similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Fabricator's Qualifications: Engage a firm that complies with the following requirements for quality control and is experienced in fabricating metal-plate-connected wood trusses similar to those indicated for this Project and with a record of successful in-service performance:

1. Fabricator participates in a recognized quality-assurance program that involves inspection by SPIB; Timber Products Inspection, Inc.; Truss Plate Institute (TPI); or other independent inspecting and testing agency acceptable to Architect and authorities having jurisdiction.

C. Comply with applicable requirements and recommendations of the following publications:

1. ANSI/TP1 1-1995, "National Design Standard for Metal-Plate-Connected Wood Truss Construction."
2. TPI HIB-91 "Commentary and Recommendations for Handling Installing & Bracing Metal Plate Connected Wood Trusses."
3. TPI DSB-89 "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."

D. Metal-Plate Connector Manufacturer's Qualifications: A manufacturer that is a member of TPI and that complies with TPI quality-control procedures for manufacture of connector plates published in ANSI/TPI 1.

E. Single-Source Responsibility for Connector Plates: Provide metal connector plates from one source and by a single manufacturer.

F. Wood Structural Design Standard: Comply with applicable requirements of AFPA's "National Design Specification for Wood Construction" and its "Supplement."

G. Single-Source Engineering Responsibility: Provide trusses engineered by metal-plate connector manufacturer to support superimposed dead and live loads indicated, with design approved and certified by a qualified professional engineer.

H. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in the jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated that have resulted in installing metal-plate-connected wood trusses similar to those indicated for this Project and with a record of successful in-service performance.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Handle and store trusses with care and comply with manufacturer's written instructions and TPI recommendations to avoid damage and lateral bending.

B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

1.8 SEQUENCING AND SCHEDULING

A. Time delivery and erection of trusses to avoid extended on-site storage and to avoid delaying progress of other trades whose work must follow erection of trusses.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Metal Connector Plates:

a. Alpine Engineered Products, Inc.
b. Computrus, Inc.
c. Mitek Industries, Inc.
d. Robbins Manufacturing Company.
e. Tee-Lok Corporation.
f. Truswal Systems Corporation.

2. Metal Framing Anchors:

a. Cleveland Steel Specialty Co.
b. Harlen Metal Products, Inc.
c. Silver Metal Products, Inc.
d. Simpson Strong-Tie Company, Inc.
e. Southeastern Metals Manufacturing Co., Inc.
f. United Steel Products Co.
g. Hughes Manufacturing, Inc.
h. Alpine Engineered Products, Inc.

2.2 DIMENSION LUMBER

A. Lumber Standards: Comply with DOC PS 20, "American Softwood Lumber Standard," and with applicable grading rules of inspection agencies certified by ALSC's Board of Review.

B. Inspection Agencies: Inspection agencies, and the abbreviations used to reference them, include the following:

1. SPIB - Southern Pine Inspection Bureau.

C. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

D. Provide dressed lumber, S4S, manufactured to actual sizes required by DOC PS 20 for moisture content specified, to comply with requirements indicated below:

1. Provide lumber with 15 percent maximum moisture content at time of dressing.

E. Grade: Provide dimension lumber capable of supporting required loads without exceeding allowable design values according to AFPA's "National Design Specification for Wood Construction" and its "Supplement." Grading may be visual or mechanical for trusses under 80 feet in length and shall be mechanical for trusses 80 feet and over in length.

2.3 METAL CONNECTOR PLATES

A. General: Fabricate connector plates from metal complying with requirements indicated below.

B. Hot-Dip Galvanized Steel Sheet: Structural-quality steel sheet, zinc coated by hot-dip process complying with ASTM A 653, G60 coating designation; Grade 33 and not less than 0.0359 inch thick.

C. Electrolytic Zinc-Coated Steel Sheet: ASTM A 879, structural-quality steel sheet, zinc coated by electrodeposition; 33,000-psi minimum yield strength, coating class C, and not less than 0.0474 inch thick.

D. Aluminum-Zinc Alloy-Coated Steel Sheet: Structural-quality steel sheet, aluminum-zinc alloy-coated by hot-dip process complying with ASTM A 792, coating designation; Grade 33 and not less than 0.0359 inch thick.

E. Stainless-Steel Sheet: ASTM A 666, Type 304 or 316, chromium nickel steel sheet; 33,000 psi minimum yield strength and not less than 0.035 inch thick.

2.4 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified below for material and manufacture.

1. Where truss members are exposed to weather or to high relative humidities, provide fasteners with a hot-dip zinc coating per ASTM A 153 or of stainless steel, Type 304 or 316.

B. Nails, Wire, Brads, and Staples: FS FF-N-105.

C. Power-Driven Fasteners: CABO NER-272.

D. Wood Screws: ASME B18.6.1.

E. Lag Bolts and Screws: ASME B18.2.

F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

2.5 METAL FRAMING ANCHORS

A. General: Provide metal framing anchors and truss–to-truss connectors of structural capacity, type, size, metal, and finish indicated that comply with requirements specified, including the following:

1. Research or Evaluation Reports: Provide products for which model code research or evaluation reports exist that are acceptable to authorities having jurisdiction and that evidence compliance of metal framing anchors for application indicated with building code in effect for this Project.
2. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis, and demonstrated by comprehensive testing performed by a qualified independent testing agency.

B. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653, G60 coating designation; structural, commercial, or lock-forming quality, as standard with manufacturer for type of anchor indicated.

C. Stainless-Steel Sheet: ASTM A 666, Type 304 or 316, chromium nickel steel sheet; 33,000-psi minimum yield strength.

2.6 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.

B. Protective Coatings: Provide one of the following coating systems:

1. SSPC-Paint 22, epoxy-polyamide primer.
2. SSPC-Paint 16, coal-tar epoxy-polyamide black or dark red paint.
3. SSPC-Paint 27 and SSPC-Paint 12, basic zinc chromate-vinyl butyral wash primer and cold-applied asphalt mastic.

2.7 FABRICATION

A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.

B. Fabricate metal connector plates to size, configuration, thickness, and anchorage details required to withstand design loadings for types of joint designs indicated.

C. Assemble truss members in design configuration indicated using jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances of ANSI/TPI 1. Position members to produce design camber indicated.

1. Fabricate wood trusses within manufacturing tolerances of ANSI/TPI 1.

D. Connect truss members by metal connector plates located and securely embedded simultaneously into both sides of wood members by air or hydraulic press or roller.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Do not install wood trusses until supporting construction is in place and is braced and secured.

B. Before installing, splice trusses delivered to Project site in more than one piece.

C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.

D. Install and brace trusses according to recommendations of TPI and as indicated.

E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.

F. Space, adjust, and align trusses in location before permanently fastening at spacing indicated on drawing.

G. Anchor trusses securely at all bearing points using metal framing anchors. Install fasteners through each fastener hole in metal framing anchor according to manufacturer's fastening schedules and written instructions.

H. Securely connect each truss ply required for forming built-up girder trusses.

1. Anchor trusses to girder trusses as indicated.

I. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.

1. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.

J. Install wood trusses within installation tolerances of ANSI/TPI 1-1995.

K. Do not cut or remove truss members.

L. Return wood trusses that are damaged or do not meet requirements to fabricator and replace with trusses that do meet requirements.

1. Truss alterations and repairs in the field shall be designed by the same engineer that provided existing truss design. Details and calculations shall be forwarded to the Architect for review prior to performing the work in the field.

3.2 REPAIRS AND PROTECTION

A. Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Protective Coating: Clean and prepare exposed surfaces of embedded-metal connector plates. Brush apply primer, when part of coating system, and one coat of protective coating.

1. Apply materials to provide minimum dry film thickness recommended by manufacturer of coating system.

END OF SECTION 061753

SECTION 062000
FINISH CARPENTRY

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following:

1. Entry shelves and corridor handrails.
2. Interior standing and running trim.
3. Miscellaneous trim and moldings.

B. Related Sections: the following Sections contain requirements that relate to this Section:

1. Division 6 Section "Rough Carpentry" furring, blocking, & other carpentry work not exposed to view.
2. Division 9 Section "Painting" priming and back priming of finish carpentry.

1.03 SUBMITTALS

A. General: submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each type of factory-fabricated product and process specified, including details of construction relative to materials, dimensions of individual components, profiles, textures, and colors.

1.04 DELIVERY, STORAGE, & HANDLING

A. Delivery and Storage: keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and under temporary coverings.

B. Do not deliver interior finish carpentry until environmental conditions meet requirements specified for installation areas. If finish carpentry must be stored in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.

1.05 PROJECT CONDITIONS

A. Environmental Limitations: do not deliver/install interior finish carpentry until building is enclosed and weatherproof, wet-work in space is completed/nominally dry, and HVAC system operating and will maintain temperature and relative humidity at occupancy levels thru the remainder of construction period.

B. Weather Limitations: proceed installing exterior finish carpentry only when existing & forecasted weather conditions will permit work to be performed per manufacturer's recommendations & warranty

requirements & at least 1 coat of specified finish applied without exposure to rain, snow, or dampness.

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

A. Lumber Standards: per DOC PS 20, "American Softwood Lumber Standard," for lumber and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee Board of Review.

B. Inspection Agencies: inspection agencies, and the abbreviations used to reference them:

1. NELMA - Northeastern Lumber Manufacturers Association.
2. NHLA - National Hardwood Lumber Association.
3. NLGA - National Lumber Grades Authority.
4. RIS - Redwood Inspection Service.
5. SCMA - Southern Cypress Manufacturers Association.
2. SPIB - Southern Pine Inspection Bureau.
3. WCLIB - West Coast Lumber Inspection Bureau.
4. WWPA - Western Wood Products Association.

C. Grade Stamps: provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

2.02 INTERIOR STANDING AND RUNNING TRIM

A. Interior paint grade trim and moldings: eastern white pine, ponderosa pine, or approved equal paint grade lumber.

B. Hardwood Trim: provide finished hardwood lumber complying with the following requirements:
1. Species: Clear, kiln-dried white hardwoods.
2. Species and Cut: Rift-sawn, clear, kiln-dried red oak selected for compatible grain and color.
3. Texture: Surfaced (smooth).
4. Lumber for Transparent Finish (Stained or Clear): Solid lumber stock.
5. Lumber for Painted Finish: Glued-up lumber or solid lumber stock.

C. Wood Molding Profiles: provide stock moldings as shown on the drawings or as per the Interior designer.

2.03 MISCELLANEOUS MATERIALS

A. Fasteners for Exterior Finish Carpentry: provide nails of non-corroding aluminum, in sufficient length to penetrate minimum of 1½ inches into substrate, unless otherwise recommended by manufacturer.

B. 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.

C. Sealant: comply with Division 7 Section "Joint Sealant" requirements for materials required for sealing siding work.

2.04 FABRICATION

A. Wood Moisture Content: comply with requirements of specified inspection agencies and manufacturer's recommendations for moisture content of finish carpentry on relative humidity conditions existing during time of fabrication and in installation areas.

B. Fabricate finish carpentry to dimensions, profiles, and details indicated.

1. Back out or kerf backs of the following members, except members with ends exposed in finished work:
   a. Exterior standing and running trim wider than 5 inches.
   b. Interior standing and running trim, except shoe mold and crown mold.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting installation and performance of finish carpentry. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

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

B. Condition finish carpentry to average prevailing humidity conditions in installation areas before installation, for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

C. Prime and back-prime lumber for painted finish exposed on the exterior. Comply with requirements for surface preparation and application in Division 9 Section "Painting."

3.03 INSTALLATION, GENERAL

A. Do not use finish carpentry materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.

3.04 STANDING & RUNNING TRIM INSTALLATION

A. Install with minimum number 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. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across joints, if required.

1. Match color and grain pattern across joints.
2. Install trim after gypsum board joint finishing operations are completed.
3. Drill pilot holes in hardwood before fastening to prevent splitting. Countersink fastener heads on exposed carpentry work and fill holes.

4. Fit exterior joints to exclude water. Apply flat grain lumber with bark side exposed to weather.

3.05 ADJUSTING

A. Repair damaged or defective finish carpentry where possible to eliminate functional or visual defects. Where not possible to repair, replace finish carpentry. Adjust joinery for uniform appearance.

3.06 CLEANING

A. Clean finish carpentry on exposed and semi-exposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

3.07 PROTECTION

A. Provide final protection and maintain conditions that ensure finish carpentry is without damage or deterioration at the time of Substantial Completion.

END OF SECTION 062000

SECTION 062023 - INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior trim.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view.
2. Section 099123 "Interior Painting" for priming and backpriming of interior finish carpentry.

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:

1. Interior trim.

B. Product Data Submittals: 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.

C. Samples: For each exposed product and for each color and texture specified.

D. Samples for Initial Selection: For each type of product involving selection of colors, profiles, or textures.

E. Samples for Verification:

1. For each species and cut of lumber and panel products with nonfactory-applied finish, with half of exposed surface finished; 50 sq. in. (300 sq. cm) for lumber and 8 by 10 inches (200 by 250 mm) for panels.
2. For each finish system and color of lumber and panel products with factory-applied finish, 50 sq. in. (300 sq. cm) for lumber and 8 by 10 inches (200 by 250 mm) for panels.

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 2 - 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.

B. Softwood Plywood: DOC PS 1.

C. Hardboard: ANSI A135.4.

D. MDF: ANSI A208.2, Grade 130.

E. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.

2.2 INTERIOR TRIM

A. Lumber Trim for Opaque Finish (Painted Finish):

1. Species and Grade:
   a. Alder, aspen, basswood, cottonwood, gum, magnolia, soft maple, sycamore, tupelo, or yellow poplar; NHLA A Finish.
2. Maximum Moisture Content for Hardwoods: 13 percent.
3. Finger Jointing: Allowed.
4. Face Surface: Surfaced (smooth).
5. Optional Material: Primed MDF of same actual dimensions as lumber indicated may be used in lieu of lumber.

B. Moldings for Opaque Finish (Painted Finish): Made to patterns included in MMPA's "WM/Series Softwood Moulding Patterns."

1. Hardwood Moldings: MMPA WM 4, P-grade.

   a. Species: Aspen, basswood, cottonwood, gum, magnolia, soft maple, tupelo, or yellow poplar.
   b. Maximum Moisture Content: 9 percent.

2. Finger Jointing: Allowed.
3. Optional Material: Primed MDF.

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. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.

C. 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 (25 mm) in nominal thickness to 1/16-inch (1.5-mm) radius and edges of lumber 1 inch (25 mm) or more in nominal thickness to 1/8-inch (3-mm) 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.
4. Install to tolerance of 1/8 inch in 96 inches (3 mm in 2438 mm) for level and plumb. Install adjoining interior finish carpentry with 1/32-inch (0.8-mm) maximum offset for flush installation and 1/16-inch (1.5-mm) 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 INSTALLATION OF INTERIOR TRIM

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 (610 mm) 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. Install trim after gypsum-board joint finishing operations are completed.
7. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting.
8. Fasten to prevent movement or warping.
9. 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

SECTION 064116 - PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plastic-laminate-clad architectural cabinets.
2. Cabinet hardware and accessories.
3. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-clad architectural cabinets that are not concealed within other construction.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets that are concealed within other construction before cabinet installation.
2. Section 123623.13 "Plastic-Laminate-Clad Countertops."

1.2 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.

B. Hardware Coordination: Distribute copies of approved hardware schedule specified in Section 087111 "Door Hardware (Descriptive Specification)" to manufacturer of architectural cabinets; coordinate Shop Drawings and fabrication with hardware requirements.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Show large-scale details.
3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
4. Show locations and sizes of cutouts and holes for items installed in plastic-laminate architectural cabinets.
5. Apply AWI Quality Certification Program label to Shop Drawings.

C. Samples for Initial Selection: For each type of exposed finish.

D. Samples for Verification: For the following:

1. Plastic Laminates: 8 by 10 inches (200 by 250 mm), for each type, color, pattern, and surface finish required.

a. Provide one sample applied to core material with specified edge material applied to one edge.

2. Thermally Fused Laminate (TFL) Panels: 8 by 10 inches (200 by 250 mm), for each color, pattern, and surface finish.

a. Provide edge banding on one edge.

3. Corner Pieces:

a. Cabinet-front frame joints between stiles and rails and at exposed end pieces, 18 inches (450 mm) high by 18 inches (450 mm) wide by 6 inches (150 mm) deep.
b. Miter joints for standing trim.

4. Exposed Cabinet Hardware and Accessories: One full-size unit for each type and finish.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer and Installer.

B. Product Certificates: For the following:

1. Composite wood products.
2. Thermally fused laminate panels.
3. High-pressure decorative laminate.
4. Glass.
5. Adhesives.

C. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

1.5 CLOSEOUT SUBMITTALS

A. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.6 QUALITY ASSURANCE

A. Manufacturer's Qualifications: 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.

1. Manufacturer's Certification: Licensed participant in AWI's Quality Certification Program.

B. Installer Qualifications: Licensed participant in AWI's Quality Certification Program.

C. 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 mockups of typical architectural cabinets as shown on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.8 FIELD CONDITIONS

A. Environmental Limitations with Humidity Control: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 43 and 70 percent during the remainder of the construction period.

B. Field Measurements: Where cabinets are 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 cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL CABINET 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. D.R. Nickelson & Co., 229 NW Wilks Ln., Lake City, FL 32055, (386) 755-6565.

2.2 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of cabinets indicated for construction, finishes, installation, and other requirements.

1. Provide labels and certificates from AWI certification program indicating that woodwork and installation complies with requirements of grades specified.

B. Architectural Woodwork Standards Grade: Custom.

C. Type of Construction: Frameless.

D. Door and Drawer-Front Style: Flush overlay.

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

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Formica Corporation.
b. Wilsonart LLC.

F. Laminate Cladding for Exposed Surfaces:

1. Horizontal Surfaces: Grade HGS.
2. Postformed Surfaces: Grade HGP.
3. Vertical Surfaces: Grade HGS.
4. Edges: Grade HGS.
5. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels.

G. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade CLS.

a. Edges of Plastic-Laminate Shelves: PVC edge banding, 3.0 mm thick, matching laminate in color, pattern, and finish.
b. Edges of Thermally Fused Laminate Panel Shelves: PVC or polyester edge banding.
c. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade VGS.

2. Drawer Sides and Backs: Thermally fused laminate panels with PVC or polyester edge banding.
3. Drawer Bottoms: Thermally fused laminate panels.

H. Dust Panels: 1/4-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers unless located directly under tops.

I. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.

J. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners or glued dovetail joints.

K. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
1. Match Architect's sample.

2.3 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

1. Wood Moisture Content: 8 to 13 percent.

B. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
1. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130.
2. Particleboard (Medium Density): ANSI A208.1, Grade M-2-Exterior Glue.
3. Softwood Plywood: DOC PS 1, medium-density overlay.
4. Thermally Fused Laminate (TFL) Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.4 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 087111 "Door Hardware (Descriptive Specification)."

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. Accuride International.
b. Blum, Julius & Co., Inc.
c. Knape & Vogt Manufacturing Company.

B. Frameless Concealed Hinges (European Type): ANSI/BHMA A156.9, B01602, 100 degrees of opening, self-closing.

C. Back-Mounted Pulls: ANSI/BHMA A156.9, B02011.

D. Wire Pulls: Back mounted, solid metal, 5 inches (127 mm) long, 2-1/2 inches (63.5 mm) deep, and 5/16 inch (8 mm) in diameter.

E. Shelf Rests: ANSI/BHMA A156.9, B04013; two-pin plastic with shelf hold-down clip.

F. Drawer Slides: ANSI/BHMA A156.9.
1. Heavy-Duty (Grade 1HD-100 and Grade 1HD-200): Side mount.

a. Type: Full extension.
b. Material: Zinc-plated ball bearing slides.
c. Motion Feature: Self-closing mechanism.

2. Pencil drawers not more than 3 inches (75 mm) high and not more than 24 inches (600 mm) wide, provide 50 lb (22.7 kg) load capacity.
3. General-purpose drawers more than 3 inches (75 mm) high, but not more than 6 inches (150 mm) high and not more than 24 inches (600 mm) wide, provide 75 lb (34 kg) load capacity.
4. File drawers more than 6 inches (150 mm) high or more than 24 inches (600 mm) wide, provide 100 lb (45 kg) load capacity.
5. Lateral file drawers more than 6 inches (150 mm) high and more than 24 inches (600 mm) but not more than 30 inches (762 mm) wide, provide 150 lb (68 kg) load capacity.
6. Lateral file drawers more than 6 inches (150 mm) high and more than 30 inches (762 mm) wide, provide 200 lb (90.7 kg) load capacity.
7. Computer keyboard tray, provide 75 lb (34 kg) load capacity.

G. Slides for Sliding Glass Doors: ANSI/BHMA A156.9, B07063; aluminum.

H. Door Locks: ANSI/BHMA A156.11, E07121.

I. Drawer Locks: ANSI/BHMA A156.11, E07041.

J. Door and Drawer Silencers: ANSI/BHMA A156.16, L03011.

K. Tempered Float Glass for Cabinet Doors: ASTM C1048, Kind FT, Condition A, Type I, Class 1 (clear), Quality-Q3, 6 mm thick unless otherwise indicated.

1. Tint Color: None.
2. Unframed Glass Doors: Seam exposed edges seamed before tempering.

L. Mirror Glass for Cabinet Doors: ASTM C1503, Mirror Select, Quality-Q3.

1. Thickness: 6.0 mm.

M. Decorative Glass for Cabinet Doors: Provide decorative glass complying with Section 088113 "Decorative Glass Glazing."

N. Tempered Float Glass for Cabinet Shelves: ASTM C1048, Kind FT, Condition A, Type I, Class 1 (clear), Quality-Q3; with exposed edges seamed before tempering, 6 mm thick.

1. Tint Color: Gray.

O. Grommets for Cable Passage: 2-inch (51-mm) OD, molded-plastic grommets and matching plastic caps with slot for wire passage.

1. Color: Black.

P. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for ANSI/BHMA finish number indicated.
1. Satin Stainless Steel: ANSI/BHMA 630.

Q. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

2.5 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln-dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

2.6 FABRICATION

A. Fabricate architectural cabinets to dimensions, profiles, and details indicated.

B. 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 architectural cabinet fabrication will be complete.
2. Trial fit assemblies at manufacturer's shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.

C. Shop-cut openings to maximum extent possible to receive hardware, appliances, 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.

D. Install glass to comply with applicable requirements in Section 088000 "Glazing" and in GANA's "Glazing Manual."

1. For glass in frames, secure glass with removable stops.
2. For exposed glass edges, polish and grind smooth.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

3.2 INSTALLATION

A. Architectural Woodwork Standards Grade: Install cabinets to comply with quality standard grade of item to be installed.

B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.

C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.

D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm) using concealed shims.

1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches (400 mm) o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch (38-mm) penetration into wood framing, blocking, or hanging strips at wood blocking locations and No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish at plate steel blocking locations.

3.3 FIELD QUALITY CONTROL

A. Inspections: Provide inspection of installed Work through AWI's Quality Certification Program certifying that woodwork, including installation, complies with requirements of the Architectural Woodwork Standards for the specified grade.

1. Inspection entity shall prepare and submit report of inspection.

3.4 ADJUSTING AND CLEANING

A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean cabinets on exposed and semiexposed surfaces.

END OF SECTION 064116

SECTION 066400 - PLASTIC PANELING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Plastic sheet paneling.

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.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For plastic paneling and trim accessories, in manufacturer's standard sizes.

1.4 QUALITY ASSURANCE

A. Testing Agency: Acceptable to authorities having jurisdiction.

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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 PLASTIC SHEET PANELING

A. Glass-Fiber-Reinforced Plastic Paneling: Gelcoat-finished, glass-fiber-reinforced plastic panels complying with ASTM D5319. Panels shall be USDA accepted for incidental food contact.
   1. Surface-Burning Characteristics: As follows when tested by a qualified testing agency according to ASTM E84. Identify products with appropriate markings of applicable testing agency.
      a. Flame-Spread Index: 25 or less.
      b. Smoke-Developed Index: 450 or less.
   2. Nominal Thickness: Not less than 0.09 inch (2.3 mm).
   3. Surface Finish: Smooth.
   4. 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: Match panels.

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

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

D. Adhesive: As recommended by plastic paneling manufacturer.

E. Sealant: Mildew-resistant, single-component, neutral-curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Section 079200 "Joint Sealants."

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. Remove wallpaper, vinyl wall covering, loose or soluble paint, and other materials that might interfere with adhesive bond.

B. Prepare substrate by sanding high spots and filling low spots as needed to provide flat, even surface for panel installation.

C. Clean substrates of substances that could impair adhesive bond, including oil, grease, dirt, and dust.

D. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.

E. Lay out paneling before installing. Locate panel joints so that trimmed panels at corners are not less than 12 inches (300 mm) wide.

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

3.3 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.

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. Maintain uniform space between adjacent panels and between panels and floors, ceilings, and fixtures. Fill space with sealant.

G. 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 066620
MANUFACTURED TRIM AND ORNAMENTS-URETHANE

PART 1 - GENERAL

1.1 RELATED SECTIONS:

A. All contract documents apply to work of this section; this includes but is not limited to: Drawings, Instructions to Bidders, General and Supplementary Conditions and Division One Administrative Sections of the specifications.

B. Related Sections:

1. 01 33 00: Submittal Procedures
2. 01 40 00: Quality Requirements
3. 01 60 00: Product Requirements
4. 04 20 00: Unit Masonry
5. 06 10 00: Rough Carpentry
6. 06 20 00: Finish Carpentry
7. 07 90 00: Joint Protection
8. 08 90 00: Louvers and Vents
9. 09 90 00: Painting and Coating

1.2 SUMMARY:

A. Section includes furnishing and installing all selected Urethane Foam Manufactured Trim and Ornament Products, including but not limited to:

1. Standing and Running Trim
2. Entrance Units
3. Louvers
4. Gable Vents
5. Ceiling and Wall Ornamental Trim
6. Decorative Brackets

1.3 DESIGN / PERFORMANCE REQUIREMENTS:

A. Finished surfaces shall be free from cracks, pits, chips, voids, depressions, bumps, ridges waves, scratches, discoloration or other defacements.

B. Products in this section shall be designed, engineered, fabricated and installed to conform to project drawings and specifications.

C. Consult the local building code AHJ to determine suitability of Fypon products to meet project and code requirements.

1.4 SUBMITTALS:

A. Comply with provisions of Section 01 33 00: Submittal Procedures

B. Product Data: provide Manufacturer’s Data for each product to be used, including: storage and handling requirements and recommendations; preparation instructions and recommendations and installation instructions.

C. Shop drawings: submit detailed drawings showing location, profiles and product components, including but not limited to anchorage requirements, accessories and provisions for achieving desired finishes. Submit one set of CAD files for approval.

D. Product Samples: submit duplicate samples for each product component specified, representing the actual profiles, products, patterns and finishes specified. One approved sample will be returned to contractor.

1.5 QUALITY ASSURANCE:

A. Manufacturer Qualifications: manufacturer shall have not less than 10 consecutive years successful experience producing the type of prefabricated components required for project applications equivalent to the requirements for this project.

B. Installer Qualifications: installer shall have a minimum of 5 continuous years experience installing products of similar type/scope as those specified in this section.

C. Mock-Up: provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Finish areas as designated by Architect.
2. Include mock-up for each profile combination indicated on the drawings.
3. Do not proceed with remaining work until workmanship, color and sheen are approved by Architect.
4. Rework mock-up areas as required to produce acceptable work.
5. Mock-up may remain as finished work if approved by Architect.

1.6 DELIVERY, STORAGE & HANDLING:

A. Deliver all materials in original packaging, unopened with no visible damage.

B. Label each package with product contents and stock number of contents, with warranty, installation, handling and storage recommendations enclosed, available on-line or on packaging.

C. Allow for receiving, unloading, handling and movement to approved storage areas within project, and final movement to point of installation.

D. Store and protect all materials in accordance with manufacturer's requirements for environmental and physical protection. Keep temporary protective coverings in place.

E. Store products on flat level surface to prevent warping.

F. Protect materials and finish from damage during handling and installation.

1.7 PROJECT CONDITIONS:

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

B. Allow 24 hours minimum for materials adapting to conditions prior to installation.

1.8 WARRANTY:

A. Upon completion of work, provide a written Manufacturer's Limited Warranty for products installed as part of this project to the Original Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Acceptable Manufacturer: Fypon, LLC.

B. Requests for substitutions will be considered in per provisions of Section 016000.

2.2 MATERIALS:

A. Manufactured polyurethane trim and ornaments:

1. Louvers/Gable Vents and Accessories: round Louver, RLV18 with Louver Trim, RLV18x4F & with (4) Keystones, K4TF, per Louver; all prime coated.
2. Decorative Millwork: Bracket-BKT8X8X4, Prime coated. Confirm bracket selections with Drawings.

2.3 ACCESSORIES:

A. Sealant: use compatible urethane-based adhesive.
B. Fasteners: use corrosive-resistant fasteners.
C. Filler: use compatible filler putty.

2.4 FINISHES:

A. Manufacturer supplied protective barrier coat primer, resistant to UV degradation, providing interim UV protection of products which is suitable for field application of 100% acrylic latex finish paint on all urethane foam products.

PART 3 - EXECUTION

3.1 EXAMINATION:

A. Site Verification of Conditions:
1. Prior to the start of installation, inspect all preceding work to ensure that there are no conditions which will cause an unsatisfactory installation of work involving polyurethane foam products.
2. Notify Architect in writing of any unacceptable conditions that would adversely affect installation or subsequent performance of this product.
3. Do not install any work involving polyurethane foam products until unsatisfactory conditions are corrected and acceptable for proper installation of work.
4. Contractor shall be responsible for correcting or replacing all unacceptable work involving urethane products, which were installed over unsatisfactory conditions at no cost to Owner.

3.2 PREPARATION:

A. Protect surrounding and adjacent work as required preventing damage to preceding work during execution of this work.
B. Perform all preparation necessary for a successful installation of products as specified in manufacturer's installation instructions.

3.3 INSTALLATION:

A. Obtain Manufacturer's instructions for successful installation of work to be performed and become knowledgeable with all material handling and installation recommendations.
B. Ensure full compliance with Manufacturer's instructions in all aspects of tasks required. Install products in accordance with manufacturer's instructions at locations indicated on the drawings.
C. Coordinate all work with other project trades to assure proper installation and provide proper accommodations for following work by other trades.

3.4 FIELD QUALITY CONTROL:

A. After installation, check all work for flaws and defects.
B. Repair all defective work.
C. Remove and replace all damaged components that cannot be successfully repaired as determined by Project Architect.

3.5 PROTECTION:

A. Install temporary protective materials necessary to prevent damage to materials installed in this work until final acceptance of the project.

3.6 CLEANING:

A. Remove all protection materials.

B. Clean all surfaces following manufacturer's recommendations prior to final project completion. Do not use harsh cleaning materials or methods that would damage finish.

C. Dispose properly of all debris generated by this work, protection materials and cleaning materials.

END OF SECTION 066620

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Extruded polystyrene foam-plastic board.
2. Molded polystyrene foam-plastic board.
3. Polyisocyanurate foam-plastic board.
4. Glass-fiber blanket.
5. Mineral-wool blanket.
6. Loose-fill insulation.
7. Spray-applied cellulosic insulation.

B. Related Requirements:

1. Section 042000 "Unit Masonry" for insulation installed in masonry cells.
2. Section 072119 "Foamed-in-Place Insulation" for spray-applied polyurethane foam insulation.
3. Section 075423 "Thermoplastic Polyolefin (TPO) Roofing" for insulation specified as part of roofing construction.
4. Section 092900 "Gypsum Board" for sound attenuation blanket used as acoustic insulation.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Low-emitting product certification.

1.3 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.

1.4 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 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD

A. Extruded polystyrene boards in this article are also called "XPS boards." Roman numeral designators in ASTM C 578 are assigned in a fixed random sequence, and their numeric order does not reflect increasing strength or other characteristics.

B. Extruded Polystyrene Board, Type IV Exterior block walls: ASTM C 578, Type IV, 25-psi (173-kPa) minimum compressive strength; unfaced; maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

    a. Dow Chemical Company (The).

2. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

2.2 GLASS-FIBER BLANKET

A. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:

1. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.
2. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.

B. Glass-Fiber Blanket, Unfaced: ASTM C 665, Type I; 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. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. CertainTeed Corporation.
    b. Guardian Building Products, Inc.
    c. Johns Manville; a Berkshire Hathaway company.
    d. Owens Corning.

2. Locations for sound control:

a. All stud residential corridor walls throughout the building.
b. All perimeter stud walls of public toilet rooms.
c. All perimeter stud walls of mechanical rooms.
d. All stud walls between Main Kitchen and Dining Rooms.
e. All walls between individual offices and between offices and public spaces.
f. All other walls where shown and indicated by specific wall types.

C. Glass-Fiber Blanket, Kraft Faced: ASTM C 665, Type II (nonreflective faced), Class C (faced surface not rated for flame propagation); Category 1 (membrane is a vapor barrier).

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed Corporation.
b. Guardian Building Products, Inc.
c. Johns Manville; a Berkshire Hathaway company.
d. Owens Corning.

2. Locations: Exterior stud walls or as shown by specific wall type.

2.3 MINERAL-WOOL BLANKETS

A. Mineral-Wool Blanket, Unfaced: 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. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Industrial Insulation Group, LLC (IIG-LLC).
b. Thermafiber, Inc.; an Owens Corning company.

2. Locations:

a. Fire rated walls as required by UL assembly.
b. Fire rated sound walls in accordance with UL assembly.

2.4 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.

1. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch (0.762 mm) thick by 2 inches (50 mm) square.
2. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch (2.67 mm) in diameter; length to suit depth of insulation.

B. Adhesively Attached, Angle-Shaped, Spindle-Type Anchors: Angle welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.

1. Angle: Formed from 0.030-inch- (0.762-mm-) thick, perforated, galvanized carbon-steel sheet with each leg 2 inches (50 mm) square.
2. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch (2.67 mm) in diameter; length to suit depth of insulation.

C. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick galvanized-steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches (38 mm) square or in diameter.

1. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in the following locations:

a. Crawl spaces.
b. Ceiling plenums.
c. Attic spaces.

D. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates without damaging insulation, fasteners, or substrates.

2.5 ACCESSORIES

A. Insulation for Miscellaneous Voids:

1. Glass-Fiber Insulation: ASTM C 764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.
2. Spray Polyurethane Foam Insulation: ASTM C 1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

B. 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.

C. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide ventilation between insulated attic spaces and vented eaves.

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. 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 CAVITY-WALL INSULATION

A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches (610 mm) o.c. both ways on inside face and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.

1. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Section 042000 "Unit Masonry."

3.4 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

A. 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 (76-mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. Attics: Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
5. For metal-framed wall cavities where cavity heights exceed 96 inches (2438 mm), support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
6. For wood-framed construction, install blankets according to ASTM C 1320 and as follows:

    a. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.

B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).
2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.5 INSTALLATION OF CURTAIN-WALL INSULATION

A. Install board insulation in curtain-wall construction according to curtain-wall manufacturer's written instructions.

1. Hold insulation in place by securing metal clips and straps or integral pockets within window frames, spaced at intervals recommended in writing by insulation manufacturer to hold insulation securely in place without touching spandrel glass. Maintain cavity width of dimension indicated on Drawings between insulation and glass.
2. Install insulation to fit snugly without bowing.

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 072413 - POLYMER-BASED EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. EIFS-clad barrier-wall assemblies that are field applied over substrate.

B. Related Requirements:
1. Section 072600 "Vapor Retarders" for wall sheet vapor retarders.
2. Section 072726 "Fluid-Applied Membrane Air Barriers" for fluid-applied, synthetic polymer air barriers applied over sheathing behind EIFS-clad wall assemblies.

1.2 DEFINITIONS

A. Definitions in ASTM E2110 apply to Work of this Section.

B. EIFS: Exterior insulation and finish system(s).

C. FBC: Florida Building Code

D. IBC: International Building Code.

E. Polymer-Based Exterior Insulation and Finish System: Class PB EIFS, as defined in ASTM E2568.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each EIFS component, trim, and accessory.

B. Shop Drawings: For prefabricated EIFS panels.

1. Include plans, elevations, sections, details of components including build-outs, details of penetrations and terminations, flashing details, joint locations and configurations, lifting points, fastening and anchorage details including mechanical fasteners, and connections and attachments to other work.

C. Panel Schedule: For prefabricated panel fabrication.

D. Samples: For each exposed product and for each color and texture specified, 8 inches (200 mm) square in size.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Manufacturer Certificates: Signed by EIFS manufacturer, certifying the following:

1. EIFS substrate is acceptable to EIFS manufacturer.
2. Accessory products installed with EIFS, including joint sealants, flashing, water-resistant barriers, trim, whether or not furnished by EIFS manufacturer and whether or not specified in this Section, are acceptable to EIFS manufacturer.

C. Product Certificates: For cementitious materials and aggregates and for insulation, from manufacturer.

D. Product Test Reports: For each EIFS assembly and component, for tests performed by a qualified testing agency.

E. Field quality-control reports.

F. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For EIFS to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An installer who is certified in writing by AWCI International as qualified to install Class PB EIFS using trained workers.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, to set quality standards for materials and execution, and to set quality standards for fabrication and installation.

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.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original, unopened packages with manufacturers' labels intact and clearly identifying products.

B. Store materials inside and under cover; keep them dry and protected from weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, construction traffic, and other causes.

1. Stack insulation board flat and off the ground.
2. Protect plastic insulation against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions and ambient outdoor air, humidity, and substrate temperatures permit EIFS to be applied, dried, and cured according to manufacturers' written instructions and warranty requirements.

1. Proceed with installation of adhesives or coatings only when ambient temperatures have remained, or are forecast to remain, above 40 deg F (4.4 deg C) for a minimum of 24 hours before, during, and after application. Do not apply EIFS adhesives or coatings during rainfall.

1.10 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace components of EIFS that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Bond integrity and weathertightness.
b. Deterioration of EIFS finishes and other EIFS materials beyond normal weathering.

2. Warranty coverage includes the following EIFS components:

a. EIFS finish, including base coats, finish coats, and reinforcing mesh.
b. Insulation installed as part of EIFS, including buildouts.
c. Insulation adhesive and mechanical fasteners.
d. EIFS accessories, including trim components and flashing.

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Dryvit Systems, Inc.
2. Senergy; BASF Corp.
3. Sto Corp.

B. Source Limitations: Obtain EIFS from single source from single EIFS manufacturer and from sources approved by EIFS manufacturer as tested and compatible with EIFS components.

2.2 PERFORMANCE REQUIREMENTS

A. EIFS Performance: Comply with ASTM E2568 and with the following:

1. Weathertightness: Resistant to water penetration from exterior.
2. System Fire Performance: Fire-resistance rating of wall assembly.
3. Structural Performance of Assembly and Components:
   a. Wind Loads: Uniform pressure as indicated on Drawings.
4. Impact Performance: ASTM E2568, High impact resistance.
5. Abrasion Resistance of Finish Coat: Sample consisting of 1-inch- (25.4-mm-) thick EIFS mounted on 1/2-inch- (12.7-mm-) thick gypsum board; cured for a minimum of 28 days and shows no cracking, checking, or loss of film integrity after exposure to 528 quarts (500 L) of sand when tested according to ASTM D968, Method A.
6. Mildew Resistance of Finish Coat: Sample applied to 2-by-2-inch (50.8-by-50.8-mm) clean glass substrate; cured for 28 days and shows no growth when tested according to ASTM D3273 and evaluated according to ASTM D3274.

B. Performance of Prefabricated Panels: EIFS shall be designed as follows and withstand the structural performance indicated for Class PB EIFS and thermal movement limits indicated below without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design prefabricated panels, including comprehensive engineering analysis, using performance requirements and design criteria indicated.
2. Structural Performance: EIFS shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to ASCE/SEI 7:
   a. Wind Loads: Uniform pressure as indicated on Drawings.
3. Deflection Limits: Design prefabricated panels to withstand design loads without deflections greater than 1/240.
4. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   a. Temperature Change: 100 deg F (55 deg C).

2.3 EIFS MATERIALS

A. Prefabricated Panels: Comply with requirements in Section 054000 "Cold-Formed Metal Framing" for metal framing supporting sheathing beneath EIFS and Section 061600 "Sheathing" for sheathing and sheathing joint treatment.

B. Flexible-Membrane Flashing: Cold-applied, self-adhering, self-healing, rubberized-asphalt and polyethylene-film composite sheet or tape and primer; EIFS manufacturer's standard or product recommended in writing by EIFS manufacturer.

C. Insulation Adhesive: EIFS manufacturer's standard formulation designed for indicated use; compatible with substrate and complying with one of the following:

1. Job-mixed formulation of portland cement, complying with ASTM C150/C150M, Type I, and polymer-based adhesive specified for base coat.
2. Factory-blended dry formulation of portland cement, dry polymer admixture, and fillers specified for base coat.
3. Factory-mixed noncementitious formulation designed for adhesive attachment of insulation to substrates of type indicated, as recommended by EIFS manufacturer.

D. Molded, (Expanded) Rigid Cellular Polystyrene Board Insulation: Comply with ASTM E2430/E2430M, unless otherwise noted, and the following:

1. Flame-Spread and Smoke-Developed Indexes: 25 and 450 or less, respectively, according to ASTM E84.
2. Dimensions: Provide insulation boards of not more than 24 by 48 inches (610 by 1219 mm), with thickness indicated on Drawings.
3. Foam Buildouts: Provide with profiles and dimensions indicated on Drawings.

E. Reinforcing Mesh: Balanced, alkali-resistant, open-weave, glass-fiber mesh treated for compatibility with other EIFS materials, made from continuous multi-end strands with retained mesh tensile strength of not less than 120 lbf/in. (21 dN/cm) according to ASTM E2098/E2098M and the following:

1. Reinforcing Mesh for EIFS, General: Not less than weight required to comply with impact-performance level specified in "Performance Requirements" Article.
2. Strip-Reinforcing Mesh: Not less than 3.75 oz./sq. yd. (127 g/sq. m).
3. Detail-Reinforcing Mesh: Not less than 4.0 oz./sq. yd. (136 g/sq. m).
4. Corner-Reinforcing Mesh: Not less than 7.2 oz./sq. yd. (244 g/sq. m).

F. Base Coat: EIFS manufacturer's standard mixture complying with one of the following:

1. Job-mixed formulation of portland cement complying with ASTM C150/C150M, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use with portland cement.
2. Job-combined formulation of manufacturer's standard polymer-emulsion adhesive and manufacturer's standard dry mix containing portland cement.
3. Factory-blended dry formulation of portland cement, dry polymer admixture, and inert fillers to which only water is added at Project site.
4. Factory-mixed noncementitious formulation of polymer-emulsion adhesive and inert fillers that is ready to use without adding other materials.

G. Water-Resistant Base Coat: EIFS manufacturer's standard waterproof formulation complying with one of the following:

1. Job-mixed formulation of portland cement complying with ASTM C150/C150M, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use with portland cement.
2. Job-combined formulation of manufacturer's standard polymer-emulsion adhesive and manufacturer's standard dry mix containing portland cement.

H. Mechanical Fasteners: EIFS manufacturer's standard corrosion-resistant fasteners, consisting of thermal cap, standard washer and shaft attachments, and fastener indicated below; designed to resist Project's design loads; capable of pulling fastener head below surface of insulation board; and complying with the following:

1. For attachment to steel studs from 0.033 to 0.112 inch (0.84 to 2.84 mm) in thickness, provide steel drill screws complying with ASTM C954.
2. For attachment to light-gage steel framing members not less than 0.0179 inch (0.45 mm) in thickness, provide steel drill screws complying with ASTM C1002.
3. For attachment to wood framing members and plywood sheathing, provide steel drill screws complying with ASTM C1002, Type W.
4. For attachment to masonry and concrete substrates, provide sheathing dowel in form of a plastic wing-tipped fastener with thermal cap, sized to fit insulation thickness indicated and to penetrate substrate to depth required to secure anchorage.

I. Primer: EIFS manufacturer's standard factory-mixed, elastomeric-polymer primer for preparing base-coat surface for application of finish coat.

J. Finish Coat: EIFS manufacturer's standard acrylic-based coating with enhanced mildew resistance complying with the following:

1. Factory-mixed formulation of polymer-emulsion binder, colorfast mineral pigments, sound stone particles, and fillers.

2. Colors: Match Architect's sample.
3. Textures: As selected by Architect from manufacturer's full range.

K. Water: Potable.

L. Trim Accessories: Type as designated or required to suit conditions indicated and to comply with EIFS manufacturer's written instructions; manufactured from UV-stabilized PVC; and complying with ASTM D1784 and ASTM C1063.

1. Casing Bead: Prefabricated, one-piece type for attachment behind insulation, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg.
2. Drip Screed/Track: Prefabricated, one-piece type for attachment behind insulation, with face leg extended to form a drip, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg.
3. Expansion Joint: Closed-cell polyethylene backer rod and elastomeric sealant, 3/4-inch (19-mm) minimum.

4. Windowsill Flashing: Prefabricated type for both flashing and sloping sill over framing beneath windows; with end and back dams; designed to direct water to exterior.
5. Parapet Cap Flashing: Type for both flashing and covering parapet top, with design complying with ASTM C1397 and ANSI/SPRI/FM 4435/ES-1.

2.4 MIXING

A. Comply with EIFS manufacturer's requirements for combining and mixing materials. Do not introduce admixtures, water, or other materials, except as recommended by EIFS manufacturer. Mix materials in clean containers. Use materials within time period specified by EIFS manufacturer or discard.

PART 3 - EXECUTION

3.1 EXAMINATION

A. 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 roof edges, wall framing, flashings, openings, substrates, and junctures at other construction for suitable conditions where EIFS will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Begin coating application only after surfaces are dry.
2. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Protect contiguous work from moisture deterioration and soiling caused by application of EIFS. Provide temporary covering and other protection needed to prevent spattering of exterior finish coats on other work.

B. Protect EIFS, substrates, and wall construction behind them from inclement weather during installation. Prevent penetration of moisture behind EIFS and deterioration of substrates.

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

1. Concrete Substrates: Provide clean, dry, neutral-pH substrate for insulation installation. Verify suitability of substrate by performing bond and moisture tests recommended by EIFS manufacturer.

3.3 EIFS INSTALLATION, GENERAL

A. Comply with ASTM C1397, ASTM E2511, and EIFS manufacturer's written instructions for installation of EIFS as applicable to each type of substrate.

3.4 SUBSTRATE PROTECTION APPLICATION

A. Flexible-Membrane Flashing: Apply and lap to shed water; seal at openings, penetrations, and terminations. Prime substrates with flashing primer if required and install flashing.

3.5 TRIM INSTALLATION

A. Trim: Apply trim accessories at perimeter of EIFS, at expansion joints, at windowsills, and elsewhere as indicated. Coordinate with installation of insulation.

1. Drip Screed/Track: Use at bottom edges of EIFS unless otherwise indicated.
2. Windowsill Flashing: Use at windows unless otherwise indicated.
3. Expansion Joint: Use where indicated on Drawings.
4. Casing Bead: Use at other locations.
5. Parapet Cap Flashing: Use where indicated on Drawings.

3.6 INSULATION INSTALLATION

A. Board Insulation: Adhesively attach insulation to substrate in compliance with ASTM C1397 and the following:

1. Sheathing: Apply adhesive to insulation by notched-trowel method in a manner that results in coating the entire surface of sheathing with adhesive once insulation is adhered to substrate. Apply adhesive to a thickness of not less than 1/4 inch (6.4 mm) for factory mixed and not less than 3/8 inch (10 mm) for field mixed, measured from surface of insulation before placement.
2. Concrete or Masonry: Apply adhesive by ribbon-and-dab method.
3. Press and slide insulation into place. Apply pressure over entire surface of insulation to accomplish uniform contact, high initial grab, and overall level surface.
4. Allow adhered insulation to remain undisturbed for not less than 24 hours, before installing mechanical fasteners, beginning rasping and sanding insulation or before applying base coat and reinforcing mesh.
5. Mechanically attach insulation to substrate. Install top surface of fastener heads flush with plane of insulation. Install fasteners into or through substrates with the following minimum penetration:

    a. Steel Framing: 5/16 inch (8 mm).
    b. Wood Framing: 1 inch (25 mm).
    c. Concrete and Masonry: 1 inch (25 mm).

6. Apply insulation over dry substrates in courses, with long edges of boards oriented horizontally.
7. Begin first course of insulation from screed/track and work upward. Work from perimeter casing beads toward interior of panels if possible.
8. Stagger vertical joints of insulation boards in successive courses to produce running bond pattern. Locate joints, so no piece of insulation is less than 12 inches (300 mm) wide or 6 inches (150 mm) high. Offset joints not less than 6 inches (150 mm) from corners of window and door openings and not less than 4 inches (100 mm) from aesthetic reveals.

a. Adhesive Attachment: Offset joints of insulation not less than 6 inches (150 mm) from horizontal and 4 inches (100 mm) from vertical joints in sheathing.
b. Mechanical Attachment: Offset joints of insulation from horizontal joints in sheathing.

9. Interlock ends at internal and external corners.
10. Abut insulation tightly at joints within and between each course to produce flush, continuously even surfaces without gaps or raised edges between boards. If gaps greater than 1/16 inch (1.6 mm) occur, fill with insulation cut to fit gaps exactly; insert insulation without using adhesive or other material.
11. Cut insulation to fit openings, corners, and projections precisely and to produce edges and shapes complying with details indicated.
12. Rasp or sand flush entire surface of insulation to remove irregularities projecting more than 1/32 inch (0.8 mm) from surface of insulation and to remove yellowed areas due to sun exposure; do not create depressions deeper than 1/16 inch (1.6 mm). Prevent airborne dispersal and immediately collect insulation raspings or sandings.
13. Cut aesthetic reveals in outside face of insulation with high-speed router and bit configured to produce grooves, rabbets, and other features that comply with profiles and locations indicated. Do not reduce insulation thickness at aesthetic reveals to less than 3/4 inch (19 mm).
14. Install foam buildouts and attach to structural substrate by adhesive and mechanical fastening.
15. Interrupt insulation for expansion joints where indicated.
16. Form joints for sealant application by leaving gaps between adjoining insulation edges and between insulation edges and dissimilar adjoining surfaces. Make gaps wide enough to produce joint widths indicated after encapsulating joint substrates with base coat and reinforcing mesh.
17. Form joints for sealant application with back-to-back casing beads for joints within EIFS and with perimeter casing beads at dissimilar adjoining surfaces. Make gaps between casing beads and between perimeter casing beads and adjoining surfaces of width indicated.
18. Before installing insulation and before applying field-applied reinforcing mesh, fully wrap board edges. Cover edges of board and extend encapsulating mesh not less than 2-1/2 inches (64 mm) over front and back face unless otherwise indicated on Drawings.
19. Treat exposed edges of insulation as follows:

    a. Except for edges forming substrates of sealant joints, encapsulate with base coat, reinforcing mesh, and finish coat.
    b. Encapsulate edges forming substrates of sealant joints within EIFS or between EIFS and other work with base coat and reinforcing mesh.
    c. At edges trimmed by accessories, extend base coat, reinforcing mesh, and finish coat over face leg of accessories.

20. Coordinate installation of flashing and insulation to produce wall assembly that does not allow water to penetrate behind flashing and EIFS lamina.

B. Expansion Joints: Install at locations indicated, where required by EIFS manufacturer, and as follows:

1. At expansion joints in substrates behind EIFS.

2. Where EIFS adjoin dissimilar substrates, materials, and construction, including other EIFS.
3. At floor lines in multilevel wood-framed construction.
4. Where wall height or building shape changes.
5. Where EIFS manufacturer requires joints in long continuous elevations.
6. Where panels abut one another.

3.7 BASE-COAT APPLICATION

A. Water-Resistant Base Coat: Apply full-thickness coverage to exposed insulation and to exposed surfaces of sloped shapes window sills parapets foam buildouts and to other surfaces indicated on Drawings.

B. Base Coat: Apply full coverage to exposed insulation and foam buildouts with not less than 1/16-inch (1.6-mm) dry-coat thickness.

C. Reinforcing Mesh: Embed reinforcing mesh in wet base coat to produce wrinkle-free installation with mesh continuous at corners, overlapped not less than 2-1/2 inches (64 mm) or otherwise treated at joints to comply with ASTM C1397. Do not lap reinforcing mesh within 8 inches (200 mm) of corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are invisible.

D. Double-Layer Reinforcing-Mesh Application: Where indicated or required, apply second base coat and second layer of reinforcing mesh, overlapped not less than 2-1/2 inches (64 mm) or otherwise treated at joints to comply with ASTM C1397 in same manner as first application. Do not apply until first base coat has cured.

E. Additional Reinforcing Mesh: Apply strip-reinforcing mesh around openings, extending 4 inches (100 mm) beyond perimeter. Apply additional 9-by-12-inch (230-by-300-mm) strip-reinforcing mesh diagonally at corners of openings (re-entrant corners). Apply 8-inch- (200-mm-) wide, strip-reinforcing mesh at both inside and outside corners unless base layer of mesh is lapped not less than 4 inches (100 mm) on each side of corners.

1. At aesthetic reveals, apply strip-reinforcing mesh not less than 8 inches (200 mm) wide.
2. Embed strip-reinforcing mesh in base coat before applying first layer of reinforcing mesh.

F. Foam Buildouts: Fully embed reinforcing mesh in base coat.

G. Double Base-Coat Application: Where indicated, apply second base coat in same manner and thickness as first application, except without reinforcing mesh. Do not apply until first base coat has cured.

3.8 FINISH-COAT APPLICATION

A. Primer: Apply over dry base coat.

B. Finish Coat: Apply full-thickness coverage over dry primed base coat, maintaining a wet edge at all times for uniform appearance, to produce a uniform finish of color and texture matching approved sample and free of cold joints, shadow lines, and texture variations.

1. Embed aggregate in finish coat to produce a uniform applied-aggregate finish of color and texture matching approved sample.

C. Sealer Coat: Apply over dry finish coat, in number of coats and thickness required by EIFS manufacturer.

3.9 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. As stipulated in Ch. 17 of the IBC/FBC.

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

C. EIFS Tests and Inspections: According to ASTM E2568.

D. EIFS will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.10 CLEANING AND PROTECTION

A. Remove temporary covering and protection of other work. Promptly remove coating materials from window and door frames and other surfaces outside areas indicated to receive EIFS coatings.

END OF SECTION 072413

SECTION 072500 - WEATHER BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Building wrap.
   2. Flexible flashing.
   3. Drainage material.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

   1. For building wrap, include data on air and water-vapor permeance based on testing according to referenced standards.

B. Shop Drawings: Show details of building wrap at terminations, openings, and penetrations. Show details of flexible flashing applications.

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For water-resistive barrier and flexible flashing, from ICC-ES.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER

A. Building Wrap: ASTM E1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E84; UV stabilized; and acceptable to authorities having jurisdiction.

   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      a. DuPont de Nemours, Inc.
      b. The Dow Chemical Company.

2. Water-Vapor Permeance: Not less than 20 perms (1150 ng/Pa x s x sq. m) per ASTM E96/E96M, Desiccant Method (Procedure A).
3. Air Permeance: Not more than 0.004 cfm/sq. ft. at 0.3-inch wg (0.02 L/s x sq. m at 75 Pa) when tested according to ASTM E2178.
4. Allowable UV Exposure Time: Not less than three months.
5. Flame Propagation Test: Materials and construction shall be as tested according to NFPA 285.

B. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

2.2 FLEXIBLE FLASHING

A. Butyl Rubber Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.040 inch (1.0 mm).

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. DuPont de Nemours, Inc.
   b. Henry, A Carlisle Company.
2. Flame Propagation Test: Materials and construction shall be as tested according to NFPA 285.

B. Primer for Flexible Flashing: Product recommended in writing by flexible flashing manufacturer for substrate.

C. Nails and Staples: Product recommended in writing by flexible flashing manufacturer and complying with ASTM F1667.

2.3 DRAINAGE MATERIAL

A. Drainage Material: Product shall maintain a continuous open space between water-resistive barrier and exterior cladding to create a drainage plane and shall be used under siding, portland cement plaster and adhered masonry veneer.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Advanced Building Products Inc.
   b. DuPont de Nemours, Inc.
   c. Insulfoam; Carlisle Construction Materials Company.
2. Flame Propagation Test: Materials and construction shall be as tested according to NFPA 285.

PART 3 - EXECUTION

3.1 WATER-RESISTIVE BARRIER INSTALLATION

A. Cover exposed exterior surface of sheathing with water-resistive barrier securely fastened to framing immediately after sheathing is installed.

B. Cover sheathing with water-resistive barrier as follows:

1. Cut back barrier 1/2 inch (13 mm) 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 (100-mm) overlap unless otherwise indicated.

C. Building Wrap: Comply with manufacturer's written instructions and warranty requirements.

1. Seal seams, edges, fasteners, and penetrations with tape.
2. Extend into jambs of openings and seal corners with tape.

3.2 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 (100 mm) 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.

3.3 DRAINAGE MATERIAL INSTALLATION

A. Install drainage material over building wrap and flashing to comply with manufacturer's written instructions.

END OF SECTION 072500

SECTION 072600 - VAPOR RETARDERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Polyethylene vapor retarders.
2. Reinforced-polyethylene vapor retarders.

B. Related Requirements:

1. Section 032900 "Under-Slab Vapor Barrier-Retarder" for under-slab vapor retarders.
2. Section 072100 "Thermal Insulation" for vapor retarders integral with insulation products.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each product, for tests performed by a qualified testing agency.

PART 2 - PRODUCTS

2.1 POLYETHYLENE VAPOR RETARDERS

A. Polyethylene Vapor Retarders: ASTM D 4397, 6-mil- (0.15-mm-) thick sheet, with maximum permeance rating of 0.1 perm (5.7 ng/Pa x s x sq. m).

2.2 REINFORCED-POLYETHYLENE VAPOR RETARDERS

A. Reinforced-Polyethylene Vapor Retarders: Sheet with outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either nylon cord or polyester scrim and weighing not less than 20 lb/1000 sq. ft. (9 kg/100 sq. m), with maximum permeance rating of 0.1 perm (5.7 ng/Pa x s x sq. m).

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Dow Chemical Company (The).
b. Owens Corning.

2.3 ACCESSORIES

A. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

B. Adhesive for Vapor Retarders: Product recommended by vapor-retarder manufacturer and has demonstrated capability to bond vapor retarders securely to substrates indicated.

C. Vapor-Retarder Fasteners: Pancake-head, self-tapping steel drill screws; with fender washers.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to vapor retarders, including removing projections capable of puncturing vapor retarders.

3.2 INSTALLATION OF VAPOR RETARDERS ON FRAMING

A. Place vapor retarders on side of construction indicated on Drawings.

B. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives, vapor retarder fasteners, or other anchorage system as recommended by manufacturer. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.

C. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs and sealing with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Locate all joints over framing members or other solid substrates.

D. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.

E. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

3.3 PROTECTION

A. Protect vapor retarders from damage until concealed by permanent construction.

END OF SECTION 072600

SECTION 072726 - FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Vapor-permeable, fluid-applied air barriers.

B. Related Requirements:

   1. Section 061600 "Sheathing" for wall sheathings and wall sheathing joint-and-penetration treatments.
   2. Section 072500 "Weather Barriers" for weather barriers, including building paper flexible flashing and building wraps with air-barrier properties.

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 accessories applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

   1. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

   1. Include manufacturer's written instructions for evaluating, preparing, and treating each substrate; technical data; dry film thickness; and tested physical and performance properties of products.

B. Shop Drawings: For air-barrier assemblies.

   1. Show locations and extent of air-barrier materials, accessories, and assemblies specific to Project conditions.

2. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
3. Include details of interfaces with other materials that form part of air barrier.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer. Include list of ABAA-certified installers and supervisors employed by Installer, who work on Project.

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: For each air-barrier assembly, for tests performed by a qualified testing agency.

D. Field quality-control reports.

1.6 QUALITY ASSURANCE

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

1. Installer shall be licensed by ABAA according to ABAA's Quality Assurance Program and shall employ ABAA-certified installers and supervisors on Project.

B. Mockups: Build mockups to set quality standards for materials and execution.

1. Build integrated mockups of exterior wall assembly as selected by Architect, 150 sq. ft. (14 sq. m), incorporating backup wall construction, external cladding, window, storefront, door frame and sill, insulation, ties and other penetrations, and flashing to demonstrate surface preparation, crack and joint treatment, application of air barriers, and sealing of gaps, terminations, and penetrations of air-barrier assembly.

    a. Coordinate construction of mockups to permit inspection and testing of air barrier 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 and apply air barrier 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.

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.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended in writing 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.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction shall be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior 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, tie-ins to installed waterproofing, 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. (0.2 L/s x sq. m of surface area at 75 Pa), when tested according to ASTM E2357.

2.3 LOW-BUILD AIR BARRIERS, VAPOR PERMEABLE

A. Low-Build, Vapor-Permeable Air Barrier: Synthetic polymer material with an installed dry film thickness, according to manufacturer's written instructions, of 6 to 15 mils (1.5 to 0.38 mm) over smooth, void-free substrates.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Henry Air-Block 17 MR.

b. MasterSeal AWB 665.

2. Physical and Performance Properties:

a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. (0.02 L/s x sq. m of surface area at 75-Pa) pressure difference; ASTM E2178.
b. Vapor Permeance: Minimum 10 perms (580 ng/Pa x s x sq. m); ASTM E96/E96M, Desiccant Method, Procedure A.
c. Ultimate Elongation: Minimum 250 percent; ASTM D412, Die C.
d. Adhesion to Substrate: Minimum 30 lbf/sq. in. (207 kPa) when tested according to ASTM D4541.
e. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
f. UV Resistance: Can be exposed to sunlight for 180 days according to manufacturer's written instructions.

2.4 ACCESSORY MATERIALS

A. Requirement: Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.

B. Primer: Liquid primer recommended for substrate by air-barrier material manufacturer.

C. Stainless-Steel Sheet: ASTM A240/A240M, Type 304, 0.0250 inch (0.64 mm) thick, and Series 300 stainless-steel fasteners.

D. Preformed Silicone Extrusion: Manufacturer's standard system consisting of cured low-modulus silicone extrusion, sized to fit opening widths, with a single-component, neutral-curing, Class 100/50 (low-modulus) silicone sealant for bonding extrusions to substrates.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. The Dow Chemical Company.
b. Tremco Incorporated.
c. MasterSeal.
d. Henry.

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 substrates have cured and aged for minimum time recommended in writing by air-barrier manufacturer.
3. Verify that substrates are visibly dry and free of moisture. Test concrete substrates for capillary moisture by plastic sheet method according to ASTM D4263.
4. Verify that masonry joints are flush and completely filled with mortar.

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

3.2 SURFACE PREPARATION

A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate according to manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.

B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.

E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

F. 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.

G. 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.

H. Bridge isolation joints expansion joints and discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer's written instructions and details.

3.3 ACCESSORIES INSTALLATION

A. Install accessory materials according to air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.

1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
2. Install transition strip on roofing membrane or base flashing so that a minimum of 3 inches (75 mm) of coverage is achieved over each substrate.
3. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.

4. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.

B. 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.

C. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.

D. 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.

E. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply preformed silicone extrusion so that a minimum of 3 inches (75 mm) of coverage is achieved over each substrate. Maintain 3 inches (75 mm) of full contact over firm bearing to perimeter frames, with not less than 1 inch (25 mm) of full contact.

1. Transition Strip: Roll firmly to enhance adhesion.
2. Preformed Silicone Extrusion: Set in full bed of silicone sealant applied to walls, frame, and air-barrier material.

F. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.

G. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.

H. Seal top of through-wall flashings to air barrier with an additional 6-inch- (150-mm-) wide, transition strip.

I. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.

J. 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 (150 mm) beyond repaired areas in strip direction.

3.4 PRIMARY AIR-BARRIER MATERIAL INSTALLATION

A. Apply air-barrier material to form a seal with strips and transition strips and to achieve a continuous air barrier according to air-barrier manufacturer's written instructions and details. Apply air-barrier material within manufacturer's recommended application temperature ranges.

1. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.

2. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
3. Where multiple prime coats are needed to achieve required bond, allow adequate drying time between coats.

B. Low-Build Air Barriers: Apply continuous unbroken air-barrier material to substrates according to the following thickness. Apply an increased thickness of air-barrier material in full contact around protrusions such as masonry ties.
1. Vapor-Permeable, Low-Build Air Barrier: Total dry film thickness as recommended in writing by manufacturer to comply with performance requirements, applied in one coat. Apply additional material as needed to achieve void- and pinhole-free surface, but do not exceed thickness on which required vapor permeability is based.

C. Do not cover air barrier until it has been tested and inspected by testing agency.

D. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.5 FIELD QUALITY CONTROL

A. ABAA Quality Assurance Program: Perform examinations, preparation, installation, testing, and inspections under ABAA's Quality Assurance Program.

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

C. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:

1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
2. Air-barrier dry film thickness.
3. Continuous structural support of air-barrier system has been provided.
4. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.
5. Site conditions for application temperature and dryness of substrates have been maintained.
6. Maximum exposure time of materials to UV deterioration has not been exceeded.
7. Surfaces have been primed, if applicable.
8. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
9. Termination mastic has been applied on cut edges.
10. Strips and transition strips have been firmly adhered to substrate.
11. Compatible materials have been used.
12. Transitions at changes in direction and structural support at gaps have been provided.
13. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
14. All penetrations have been sealed.

D. Tests: As determined by testing agency from among the following tests:
   1. Adhesion Testing: Air-barrier assemblies will be tested for required adhesion to substrate according to ASTM D4541 for each 600 sq. ft. (56 sq. m) of installed air barrier or part thereof.

E. 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.

F. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

G. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.

   1. Protect air barrier from exposure to UV light and harmful weather exposure as recommended in writing by manufacturer. If exposed to these conditions for longer than recommended, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed materials 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 in writing by manufacturer of affected construction.

C. Remove masking materials after installation.

END OF SECTION 072726

SECTION 073113 - ASPHALT SHINGLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Glass-fiber-reinforced asphalt shingles.
2. Underlayment materials.
3. Ridge vents.
4. Metal flashing and trim.

B. Related Requirements:

1. Section 077200 "Roof Accessories" for roof ventilators.

1.2 ALTERNATES

A. See Section 012300 "Alternates" for description of alternates affecting items specified under this Section.

1.3 DEFINITIONS

A. Roofing Terminology: See ASTM D1079 for definitions of terms related to roofing Work in this Section.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Asphalt shingles.
2. Underlayment materials.
3. Ridge vents.
4. Asphalt roofing cement.
5. Elastomeric flashing sealant.

B. Shop Drawings: For metal flashing and trim.

C. Samples: For each exposed product and for each color and blend specified, in sizes indicated.

1. Asphalt Shingles: Full size.
2. Ridge and Hip Cap Shingles: Full size.
3. Ridge Vent: 12-inch- (305-mm-) long Sample.
4. Exposed Valley Lining: 12 inches (305 mm) square.

D. Samples for Initial Selection:

1. For each type of asphalt shingle indicated.
2. For each type of accessory involving color selection.

E. Samples for Verification: For the following products, in sizes indicated:

1. Asphalt Shingles: Full size.
2. Ridge and Hip Cap Shingles: Full size.
3. Ridge Vent: 12-inch- (305-mm-) long Sample.
4. Exposed Valley Lining: 12 inches (305 mm) square.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each type of asphalt shingle and underlayment product indicated, for tests performed by a qualified testing agency.

C. Research Reports: For synthetic underlayment, from an agency acceptable to authorities having jurisdiction or ICC-ES, indicating that product is suitable for intended use under applicable building codes.

D. Sample Warranty: For manufacturer's materials warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For asphalt shingles to include in maintenance manuals.

B. Materials warranties.

C. Roofing Installer's warranty.

1.7 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. Asphalt Shingles: 100 sq. ft. (9.3 sq. m) of each type and in each color and blend, in unbroken bundles.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An authorized installer who is trained and approved by manufacturer.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Store roofing materials in a dry, well-ventilated location protected from weather, sunlight, and moisture in accordance with manufacturer's written instructions.

B. Store underlayment rolls on end, on pallets or other raised surfaces. Do not double-stack rolls.

C. Protect unused roofing materials from weather, sunlight, and moisture when left overnight or when roofing Work is not in progress.

D. Handle, store, and place roofing materials in a manner to prevent damage to roof deck or structural supporting members.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Proceed with installation only when existing and forecasted weather conditions permit product installation and related Work to be performed in accordance with manufacturer's written instructions and warranty requirements.

1. Install self-adhering, polymer-modified bitumen sheet underlayment within the range of ambient and substrate temperatures recommended in writing by manufacturer.

1.11 WARRANTY

A. Materials Warranty: Manufacturer agrees to repair or replace asphalt shingles that fail within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Manufacturing defects.
b. Damage from winds below rating.

2. Materials Warranty Period: 30 years from date of Substantial Completion, prorated, with first five years nonprorated.
3. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by wind speeds of up to 130 mph (58 m/s) for 15 years from date of Substantial Completion.
4. Algae-Resistance Warranty Period: Asphalt shingles will not discolor for 10 years from date of Substantial Completion.
5. Workmanship Warranty Period: 10 years from date of Substantial Completion.

B. Roofing Installer's Warranty: On warranty form at end of this Section, signed by Installer, in which Installer agrees to repair or replace components of asphalt shingle roofing that fail in materials or workmanship within specified warranty period.

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

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of product from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Exterior Fire-Test Exposure: Provide asphalt shingles and related roofing materials identical to those of assemblies tested for Class A fire resistance in accordance with ASTM E108 or UL 790 by Underwriters Laboratories or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.

B. Wind Resistance: Provide asphalt shingles that comply with requirements of ASTM D3161/D3161M, Class F, and with ASTM D7158/D7158M, Class H.

2.3 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

A. Laminated-Strip Asphalt Shingles: ASTM D3462/D3462M, laminated, multi-ply overlay construction; glass-fiber reinforced, mineral-granule surfaced, and self-sealing.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Certainteed; SAINT-GOBAIN.
b. GAF.
c. Owens Corning.

2. Butt Edge: Straight cut.
3. Strip Size: Manufacturer's standard.
4. Algae Resistance: Granules resist algae discoloration.
5. Color and Blends: As selected by Architect from manufacturer's full range.
6. Basis of Design: GAF Timberline HDZ.

B. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles.

2.4 UNDERLAYMENT MATERIALS

A. Synthetic Underlayment: UV-resistant polypropylene, polyolefin, or polyethylene polymer fabric with surface coatings or treatments to improve traction underfoot and abrasion resistance; evaluated and documented to be suitable for use as a roof underlayment under applicable codes by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Certainteed; SAINT-GOBAIN.
b. GAF.

c. Owens Corning.

B. Self-Adhering, Polymer-Modified Bitumen Sheet: ASTM D1970/D1970M, minimum 40-mil- (1.0-mm-) thick sheet; glass-fiber-mat-reinforced, polymer-modified asphalt; with slip-resistant top surface and release backing; cold applied. Provide primer for adjoining concrete, masonry, and metal surfaces to receive underlayment.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Certainteed; SAINT-GOBAIN.
b. GAF.
c. Owens Corning.

2.5 RIDGE VENTS

A. Rigid Ridge Vent: Manufacturer's standard, rigid-section, high-density, UV-stabilized plastic ridge vent for use under ridge shingles.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Certainteed; SAINT-GOBAIN.
b. GAF.
c. Owens Corning.

2. Minimum Net Free Area: 20 sq. in./ lf.
3. Width: Per manufacturers compatible system.
4. Thickness: Per manufacturers compatible system.
5. Features:

a. Nonwoven geotextile filter strips.
b. External deflector baffles.

2.6 ACCESSORIES

A. Asphalt Roofing Cement: ASTM D4586/D4586M Type II, asbestos free.

B. Elastomeric Flashing Sealant: ASTM C920, Type S, Grade NS, one-part, non-sag, elastomeric polymer sealant; of class and use classifications required to seal joints and remain watertight; recommended in writing by manufacturer for installation of flashing systems.

C. Roofing Nails: ASTM F1667, aluminum, stainless steel, copper, or hot-dip galvanized-steel wire shingle nails, minimum 0.120-inch- (3-mm-) diameter, sharp-pointed, with a 3/8- to 7/16-inch- (10- to 11-mm-) diameter flat head and of sufficient length to penetrate 3/4 inch (19 mm) into solid wood decking or extend at least 1/8 inch (3 mm) through sheathing less than 3/4 inch (19 mm) thick.

1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.

D. Underlayment Nails: Aluminum, stainless steel, or hot-dip galvanized-steel wire nails with low-profile metal or plastic caps, 1-inch- (25-mm-) minimum diameter.

1. Provide with minimum 0.0134-inch- (0.34-mm-) thick metal cap, 0.010-inch- (0.25-mm-) thick power-driven metal cap, or 0.035-inch- (0.89-mm-) thick plastic cap; and with minimum 0.083-inch- (2.11-mm-) thick ring shank or 0.091-inch- (2.31-mm-) thick smooth shank of length to penetrate at least 3/4 inch (19 mm) into roof sheathing or to penetrate through roof sheathing less than 3/4 inch (19 mm) thick.

2.7 METAL FLASHING AND TRIM

A. Comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."

1. Sheet Metal: Anodized aluminum.

B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of the item unless otherwise specified in this Section or indicated on Drawings.

1. Apron Flashings: Fabricate with lower flange a minimum of 4 inches (102 mm) over and 4 inches (102 mm) beyond each side of downslope asphalt shingles and 6 inches (152 mm) up the vertical surface.
2. Step Flashings: Fabricate with a headlap of 2 inches (51 mm) and a minimum extension of 4 inches (102 mm) over the underlying asphalt shingle and up the vertical surface.
3. Counterflashings: Fabricate to cover 4 inches (102 mm) of base flashing measured vertically; and in lengths required so that no step exceeds 8 inches (203 mm) and overall length is no more than 10 feet (3 m).

a. Provide metal reglets for installation.

4. Drip Edges: Fabricate in lengths not exceeding 10 feet (3 m) with minimum 2-inch (51-mm) roof-deck flange and 1-1/2-inch (38-mm) fascia flange with 3/8-inch (10-mm) drip at lower edge.
5. Vent-Pipe Flashings: ASTM B749, Type L51121, at least 1/16 inch (1.6 mm) thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof, and extending at least 4 inches (102 mm) from pipe onto roof.

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.

1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.

2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored and that provisions have been made for flashings and penetrations through asphalt shingles.
3. Verify that vent stacks and other penetrations through roofing are installed and securely fastened.

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 OF UNDERLAYMENT MATERIALS

A. Comply with asphalt shingle and underlayment manufacturers' written installation instructions and with recommendations in NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems" applicable to products and applications indicated unless more stringent requirements are specified in this Section or indicated on Drawings.

B. Synthetic Underlayment:

1. Install on roof deck parallel with and starting at the eaves.
    a. Lap sides and ends as recommended in writing by manufacturer, but not less than 2 inches (51 mm) for side laps and 6 inches (152 mm) for end laps.
    b. Stagger end laps between succeeding courses at interval recommended in writing by manufacturer, but not less than 72 inches (1829 mm).
    c. Fasten with underlayment nails in accordance with manufacturer's written instructions.
    d. Cover underlayment within period recommended in writing by manufacturer.
2. Install in single layer on roofs sloped at 4:12 and greater.
3. Install in double layer on roofs sloped at less than 4:12.
4. Install synthetic underlayment over areas protected by self-adhering, polymer-modified bitumen sheet unless otherwise specified in this Section or indicated on Drawings.
    a. Lap sides of underlayment over self-adhering sheet not less than 4 inches (102 mm) in direction to shed water.
    b. Lap ends of underlayment not less than 6 inches (152 mm) over self-adhering sheet.
5. Install fasteners in a grid pattern of 12 inches (305 mm) between side laps with 6-inch (152-mm) spacing at side and end laps.
6. Terminate synthetic underlayment flush against sidewalls, curbs, chimneys, and other roof projections.

C. Self-Adhering, Polymer-Modified Bitumen Sheet: Install, wrinkle free, on roof deck.

1. Comply with low-temperature installation restrictions of underlayment manufacturer.
2. Install lapped in direction that sheds water.

a. Lap sides not less than 4 inches (102 mm).
b. Lap ends not less than 6 inches (152 mm), staggered 24 inches (610 mm) between succeeding courses.
c. Roll laps with roller.

3. Prime concrete, masonry, and metal surfaces to receive self-adhering sheet.
4. Eaves: Extend from edges of eaves 24 inches (610 mm) beyond interior face of exterior wall.
5. Rakes: Extend from edges of rakes 24 inches (610 mm) beyond interior face of exterior wall.
6. Valleys: Extend from lowest to highest point 18 inches (457 mm) on each side of centerline.
7. Hips: Extend 18 inches (457 mm) on each side.
8. Ridges: Extend 36 inches (914 mm) on each side without obstructing continuous ridge vent slot.
9. Sidewalls: Extend 18 inches (457 mm) beyond sidewalls and return vertically against sidewalls not less than 4 inches (102 mm).
10. Dormers, Chimneys, Skylights, and Other Roof-Penetrating Elements: Extend 18 inches (457 mm) beyond penetrating elements and return vertically against penetrating elements not less than 4 inches (102 mm).
11. Roof-Slope Transitions: Extend 18 inches (457 mm) on each roof slope.
12. Cover underlayment within seven days.

3.3 INSTALLATION OF METAL FLASHING AND TRIM

A. Install metal flashings and trim to comply with requirements in Section 076200 "Sheet Metal Flashing and Trim."

1. Install metal flashings in accordance with recommendations in NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems."
2. Bed flanges of metal flashings using asphalt roofing cement or elastomeric flashing sealant.

B. Apron Flashings: Extend lower flange over and beyond each side of downslope asphalt shingles and up the vertical surface.

C. Step Flashings: Install with a headlap of 2 inches (51 mm) and extend over underlying shingle and up the vertical face.

1. Install with lower edge of flashing just upslope of, and concealed by, butt of overlying shingle.
2. Fasten to roof deck only.

D. Cricket and Backer Flashings: Install against roof-penetrating elements extending concealed flange beneath upslope asphalt shingles and beyond each side.

E. Counterflashings: Coordinate with installation of base flashing and fit tightly to base flashing. Lap joints a minimum of 4 inches (102 mm) secured in a waterproof manner.

1. Install in reglets or receivers.

F. Rake Drip Edges: Install over underlayment materials and fasten to roof deck.

G. Eave Drip Edges: Install below underlayment materials and fasten to roof deck.

H. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer.

3.4 INSTALLATION OF ASPHALT SHINGLES

A. Install asphalt shingles in accordance with manufacturer's written instructions and recommendations in NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems."

B. Install starter strip along lowest roof edge, consisting of an asphalt shingle strip with tabs removed at least 7 inches (178 mm) wide with self-sealing strip face up at roof edge.

1. Extend asphalt shingles 3/4 inch (19 mm) over fasciae at eaves and rakes.
2. Install starter strip along rake edge.

C. Install first and remaining courses of laminated asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.

D. Fasten asphalt shingle strips with a minimum of six roofing nails, but not less than the number indicated in manufacturer's written instructions for roof slope and design wind speed indicated on Drawings and for warranty requirements specified in this Section.

1. Locate fasteners in accordance with manufacturer's written instructions.
2. Where roof slope exceeds 18:12, hand seal self-sealing asphalt shingles to improve the shingles' positive bond by applying asphalt roofing cement spots between course overlaps after nailing the upper course.
3. Where roof slope is less than 4:12, hand seal self-sealing asphalt shingles to improve the shingles' positive bond by applying asphalt roofing cement spots between course overlaps after nailing the upper course.
4. When ambient temperature during installation is below 50 deg F (10 deg C), hand seal self-sealing asphalt shingles by applying asphalt roofing cement spots between course overlaps after nailing the upper course.

E. Closed-Cut Valleys: Extend asphalt shingle strips from one side of valley 12 inches (305 mm) beyond center of valley.

1. Use one-piece shingle strips without joints in valley.
2. Fasten with extra nail in upper end of shingle. Install asphalt shingle courses from other side of valley and cut back to a straight line 2 inches (51 mm) short of valley centerline.
3. Trim upper concealed corners of cut-back shingle strips.
4. Do not nail asphalt shingles within 6 inches (152 mm) of valley center.
5. Set trimmed, concealed-corner asphalt shingles in a 3-inch- (76-mm-) wide bed of asphalt roofing cement.

F. Ridge Vents: Install continuous ridge vents over asphalt shingles in accordance with manufacturer's written instructions. Fasten with roofing nails of sufficient length to penetrate sheathing.

G. Hip and Ridge Shingles: Maintain same exposure of cap shingles as roofing-shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds.

1. Fasten with roofing nails of sufficient length to penetrate sheathing.
2. Fasten ridge cap asphalt shingles to cover ridge vent without obstructing airflow.

3.5 ROOFING INSTALLER'S WARRANTY

A. WHEREAS <**Insert name**> of <**Insert address**>, herein called the "Roofing Installer," has performed roofing and associated work ("the work") on the following project:

1. Owner: <**Insert name of Owner**>.
2. Owner Address: <**Insert address**>.
3. Building Name/Type: <**Insert information**>.
4. Building Address: <**Insert address**>.
5. Area of the Work: <**Insert information**>.
6. Acceptance Date: <**Insert date**>.
7. Warranty Period: <**Insert time**>.
8. Expiration Date: <**Insert date**>.

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant the work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that, during Warranty Period, Roofing Installer will, at Roofing Installer's own cost and expense, make or cause to be made such repairs to or replacements of the work as are necessary to correct faulty and defective work and as are necessary to maintain the work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to the work and other parts of the building, and to building contents, caused by:

a. Lightning;
b. Peak gust wind speed exceeding 130 mph (m/s);
c. Fire;
d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
e. Faulty construction of copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
f. Vapor condensation on bottom of roofing; and
g. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When the work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to the work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of the work.
4. During Warranty Period, if Owner allows alteration of the work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of the alterations, but only to the extent the alterations affect the work covered by this Warranty. If Owner engages Roofing Installer to perform the alterations, Warranty shall not become null and void unless Roofing Installer, before starting the alterations, notified Owner in writing, showing reasonable cause for claim, that the alterations would likely damage or deteriorate the work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a use or service more severe than originally specified, this Warranty shall become null and void on date of the change, but only to the extent the change affects the work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect the work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on the work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of the work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this <**Insert day**> day of <**Insert month**>, <**Insert year**>.

1. Authorized Signature: <**Insert signature**>.
2. Name: <**Insert name**>.
3. Title: <**Insert title**>.

END OF SECTION 073113

SECTION 074113.16 - STANDING-SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Standing-seam metal roof panels.

B. Related Sections:

1. Section 074293 "Soffit Panels" for metal panels used in horizontal soffit applications.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of roof accessories and roof-mounted equipment.
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 methods and procedures related to metal panel installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review structural loading limitations of deck during and after roofing.
6. Review flashings, special details, drainage, penetrations, equipment curbs, and condition of other construction that affect metal panels.
7. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
8. Review temporary protection requirements for metal panel systems during and after installation.
9. Review procedures for repair of metal panels damaged after installation.
10. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.4 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 each type of panel and accessory.

B. Shop Drawings:

1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches (1:10).

C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Metal Panels: 12 inches (305 mm) long by actual panel width. Include clips, fasteners, closures, and other metal panel accessories.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each product, for tests performed by a qualified testing agency.

C. Field quality-control reports.

D. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panels to include in maintenance manuals.

1.7 QUALITY ASSURANCE

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

B. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.

C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
   1. Build mockups for typical roof area only, including accessories.
      a. Size: 12 feet (3.5 m) long by 6 feet (1.75 m).
      b. Each type of exposed seam and seam termination.
   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. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panels during installation.

E. Copper Panels: Wear gloves when handling to prevent fingerprints and soiling of surface.

1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.10 COORDINATION

A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

B. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.11 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including rupturing, cracking, or puncturing.
b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

C. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Energy Performance: Provide roof panels that are listed on the EPA/DOE's ENERGY STAR "Roof Product List" for low-slope roof products.

B. Energy Performance: Provide roof panels according to one of the following when tested according to CRRC-1:
1. Three-year, aged Solar Reflectance Index of not less than 64 when calculated according to ASTM E1980.

C. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.
3. Deflection Limits: For wind loads, no greater than 1/180 of the span.

D. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E1680 or ASTM E283 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).

E. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E1646 or ASTM E331 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).

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

1. Uplift Rating: UL 90.

G. FM Global Listing: Provide metal roof panels and component materials that comply with requirements in FM Global 4471 as part of a panel roofing system and that are listed in FM Global's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.

1. Fire/Windstorm Classification: Class 1A- 105.
2. Hail Resistance: SH.

H. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 STANDING-SEAM METAL ROOF PANELS

A. Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
1. Aluminum Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E1637.

B. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and a flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and mechanically seaming panels together.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ATAS International, Inc.
b. PAC-CLAD; Petersen; a Carlisle company.

2. Aluminum Sheet: Coil-coated sheet, ASTM B209 (ASTM B209M), alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

   a. Thickness: 0.040 inch (1.02 mm).
   b. Surface: Smooth, flat finish.
   c. Exterior Finish: Three-coat fluoropolymer.
   d. Color: As selected by Architect from manufacturer's full range.

3. Clips: One-piece fixed to accommodate thermal movement.
   a. Material: 0.0625-inch- (1.587-mm-) thick, stainless steel sheet.

4. Joint Type: Single folded.
5. Panel Coverage: 16 inches (406 mm).
6. Panel Height: 2.0 inches (51 mm).

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils (0.76 mm) thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: Stable after testing at 240 deg F (116 deg C); ASTM D1970.
2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C); ASTM D1970.

3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. ATAS International, Inc.
   b. Carlisle WIP Products; a brand of Carlisle Construction Materials.
   c. Henry, a Carlisle Company (formerly Henry Company and Carlisle Coatings & Waterproofing Inc. brands).
   d. Owens Corning.

2.4 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C645; cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

D. Roof Curbs: Fabricated from same material as roof panels, 0.048-inch (1.2-mm) nominal thickness; with bottom of skirt profiled to match roof panel profiles and with welded top box and integral full-length cricket. Fabricate curb subframing of 0.060-inch- (1.52-mm-) nominal thickness, angle-, C-, or Z-shaped steel sheet. Fabricate curb and subframing to withstand indicated loads of size and height indicated. Finish roof curbs to match metal roof panels.

1. Insulate roof curb with 1-inch- (25-mm-) thick, rigid insulation.

E. Panel Fasteners: Self-tapping screws designed to withstand design loads.

F. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

2.5 FABRICATION

A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.

C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.

    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application, but not less than thickness of metal being secured.

2.6 FINISHES

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

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 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.

C. Aluminum Panels and Accessories:
1. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions for seacoast and severe environments.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.

1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
2. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.

a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

3.3 INSTALLATION OF UNDERLAYMENT

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches (152 mm) staggered 24 inches (610 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps with roller. Cover underlayment within 14 days.

1. Apply over the entire roof surface.

B. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 076200 "Sheet Metal Flashing and Trim."

3.4 INSTALLATION OF STANDING SEAM METAL ROOF PANELS

A. Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:
1. Aluminum Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.

C. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.

D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

E. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.

1. Install clips to supports with self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
3. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
4. Watertight Installation:

    a. Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommend in writing by manufacturer as needed to make panels watertight.
    b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
    c. At panel splices, nest panels with minimum 6-inch (152-mm) end lap, sealed with sealant and fastened together by interlocking clamping plates.

F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal roof panel manufacturers; or, if not indicated, types recommended by metal roof panel manufacturer.

G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

H. Roof Curbs: Install flashing around bases where they meet metal roof panels.

I. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

3.5 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal panel units within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect metal roof panel installation, including accessories. Report results in writing.

B. Remove and replace applications of metal roof panels where tests and inspections indicate that they do not comply with specified requirements.

C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

D. Prepare test and inspection reports.

3.7 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074113.16

SECTION 074646 - FIBER-CEMENT SIDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes fiber-cement siding and soffit.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood furring, grounds, nailers, and blocking.
2. Section 072500 "Weather Barriers" for weather-resistive barriers.

1.3 COORDINATION

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

1.4 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 Initial Selection: For fiber-cement siding and soffit including related accessories.

C. Samples for Verification: For each type, color, texture, and pattern required.

1. 12-inch- (300-mm-) long-by-actual-width Sample of siding.
2. 12-inch- (300-mm-) long-by-actual-width Sample of soffit.
3. 12-inch- (300-mm-) long-by-actual-width Samples of trim and accessories.

1.5 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of fiber-cement siding and soffit.

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.

1.6 CLOSEOUT SUBMITTALS

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

1.7 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 and soffit including related accessories, in a quantity equal to 2 percent of amount installed.

1.8 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for fabrication and installation.
1. Build mockups for fiber-cement siding and soffit including accessories.

a. Size: Area selected by Architect that represents all conditions and aligns with phasing in project schedule.
b. Include outside corner on one end of mockup and inside corner on other end.

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.

1.9 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.

1.10 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: 25 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain products, including related accessories, from single source from single manufacturer.

2.2 FIBER-CEMENT SIDING

A. General: ASTM C1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E136; with a flame-spread index of 25 or less when tested according to ASTM E84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. James Hardie Building Products, Inc.
b. Nichiha Architectural Panels.

B. Labeling: Provide fiber-cement siding that is tested and labeled according to ASTM C1186 by a qualified testing agency acceptable to authorities having jurisdiction.

C. Nominal Thickness: Not less than 5/16 inch (8 mm).

D. Horizontal Pattern: Boards 8-1/4 to 8-1/2 inches (210 to 216 mm) wide in plain style.

1. Texture: [**Smooth**] [**Rough sawn**] [**Wood grain**] <**Insert requirement**>.

E. Shingle Pattern: 48-inch- (1200-mm-) wide, staggered-edge notched sheets with wood-grain texture.

F. Factory Priming: Manufacturer's standard acrylic primer.

2.3 FIBER-CEMENT SOFFIT

A. General: ASTM C1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E136; with a flame-spread index of 25 or less when tested according to ASTM E84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. James Hardie Building Products, Inc.
b. Nichiha Architectural Panels.

B. Nominal Thickness: Not less than 5/16 inch (8 mm).

C. Pattern: 24-inch- (600-mm-) wide sheets with smooth texture.

D. Ventilation: Provide perforated soffit.

E. Factory Priming: Manufacturer's standard acrylic primer.

2.4 ACCESSORIES

A. Siding Accessories, General: Provide starter strips, edge trim, outside and inside corner caps, and other items as recommended by siding manufacturer for building configuration.

1. Provide accessories matching color and texture of adjacent siding unless otherwise indicated.

B. Decorative Accessories: Provide the following fiber-cement decorative accessories as indicated:

1. Corner posts.
2. Door and window casings.
3. Fasciae.
4. Moldings and trim.

C. Flashing: Provide aluminum flashing complying with Section 076200 "Sheet Metal Flashing and Trim" at window and door heads and where indicated.

1. Finish for Aluminum Flashing: High-performance organic finish.

D. Fasteners:

1. For fastening to wood, use siding nails of sufficient length to penetrate a minimum of 1 inch (25 mm) into substrate.
2. For fastening to metal, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1/4 inch (6 mm), or three screw-threads, into substrate.
3. For fastening fiber cement, use hot-dip galvanized fasteners.

E. Insect Screening for Soffit Vents: Aluminum, 18-by-16 (1.4-by-1.6-mm) mesh.

F. Round Soffit Vents: Perforated vents, 3/8 inch in diameter.
1. Vented soffit provides 5 inches of net free ventilation per lineal foot.

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 soffit and related accessories.

B. 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 (600 mm) o.c.

B. 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

SECTION 075423 - THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Mechanically fastened thermoplastic polyolefin (TPO) roofing system.
2. Roof insulation.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood nailers, curbs, and blocking; and for wood-based, structural-use roof deck panels.
2. Section 061600 "Sheathing" for wood-based, structural-use roof deck panels.
3. Section 072100 "Thermal Insulation" for insulation beneath the roof deck.
4. Section 076200 "Sheet Metal Flashing and Trim" for metal roof flashings and counterflashings.
5. Section 077129 "Manufactured Roof Expansion Joints" for proprietary manufactured roof expansion-joint assemblies.
6. Section 079200 "Joint Sealants" for joint sealants, joint fillers, and joint preparation.
7. Section 221423 "Storm Drainage Piping Specialties" for roof drains.

1.3 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work, including:

1. Base flashings and membrane terminations.
2. Tapered insulation, including slopes.
3. Roof plan showing orientation of plywood roof deck and orientation of roofing, fastening spacings, and patterns for mechanically fastened roofing.
4. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.

C. Samples for Verification: For the following products:

1. Sheet roofing, of color required.
2. Walkway pads or rolls, of color required.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

1. Submit evidence of compliance with performance requirements.

C. Product Test Reports: For components of roofing system, tests performed by manufacturer and witnessed by a qualified testing agency.

D. Engineering Reports: Provide Miami-Dade NOA or Florida Product Approval based on local AHJ minimum required report.

E. Research/Evaluation Reports: For components of roofing system, from ICC-ES.

F. Field quality-control reports.

G. Sample Warranties: For manufacturer's special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is FM Global approved for roofing system identical to that used for this Project.

B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

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, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.9 FIELD 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. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.

1. Special warranty includes roofing, base flashings, roof insulation, fasteners, cover boards, roofing accessories, and other components of roofing system.
2. Warranty Period: 20 years from date of Substantial Completion.

B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components of roofing system such as roofing, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period:

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Carlisle SynTec Incorporated; Carlisle Construction Materials.
2. Firestone Building Products.
3. GAF.

B. Source Limitations: Obtain components including roof insulation fasteners and accessories for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and base flashings shall remain watertight.

1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.

B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.

C. Roofing System Design: Tested by a qualified testing agency to resist the following uplift pressures:

1. Corner Uplift Pressure: Refer to Structural Drawings.
2. Perimeter Uplift Pressure: Refer to Structural Drawings.
3. Field-of-Roof Uplift Pressure: Refer to Structural Drawings.

D. FM Global Listing: Roofing, base flashings, and component materials shall comply with requirements in FM Global 4450 or FM Global 4470 as part of a built-up roofing system, and shall be listed in FM Global's "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.

1. Fire/Windstorm Classification: Class 1A-120 minimum with higher ratings indicated on Structural Drawings.
2. Hail-Resistance Rating: SH.

E. Energy Star Listing: Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.

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

G. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.3 TPO ROOFING

A. Fabric-Reinforced TPO Sheet: ASTM D 6878, internally fabric- or scrim-reinforced, uniform, flexible fabric-backed TPO sheet.

1. Thickness: 60 mils (1.5 mm), nominal.
2. Exposed Face Color: White.

2.4 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.

1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
2. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content:

a. Plastic Foam Adhesives: 50 g/L.
b. Gypsum Board and Panel Adhesives: 50 g/L.
c. Multipurpose Construction Adhesives: 70 g/L.
d. Fiberglass Adhesives: 80 g/L.
e. Single-Ply Roof Membrane Adhesives: 250 g/L.
f. Single-Ply Roof Membrane Sealants: 450 g/L.
g. Nonmembrane Roof Sealants: 300 g/L.
h. Sealant Primers for Nonporous Substrates: 250 g/L.
i. Sealant Primers for Porous Substrates: 775 g/L.
j. Other Adhesives and Sealants: 250 g/L.

B. Sheet Flashing: Manufacturer's standard unreinforced TPO sheet flashing, 55 mils (1.4 mm) thick, minimum, of same color as TPO sheet.

C. Bonding Adhesive: Manufacturer's standard.

D. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick; with anchors.

E. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick (25 mm wide by 1.3 mm thick), prepunched.

F. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roofing to substrate, and acceptable to roofing system manufacturer.

G. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.5 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by TPO roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated and that produce FM Global-approved roof insulation.

B. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, 1.6-lb/cu. ft. (26-kg/cu. m) minimum density, square edged.

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. Dow Chemical Company (The).
    b. Owens Corning.

C. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches (1:48) unless otherwise indicated.

D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.6 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with roofing.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.

C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:

1. Modified asphaltic, asbestos-free, cold-applied adhesive.

2.7 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch (5 mm) thick and acceptable to roofing system 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 roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.

B. 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. Install insulation strips according to acoustical roof deck manufacturer's written instructions.

3.3 ROOFING INSTALLATION, GENERAL

A. Install roofing system according to roofing system manufacturer's written instructions.

B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

C. Install roofing and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition and to not void warranty for existing roofing system.

3.4 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 and insulation manufacturer's written instructions for installing roof insulation.

C. Install tapered insulation under area of roofing to conform to slopes indicated.

D. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches (68 mm) or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.

1. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.

E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

F. 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 (6 mm) with insulation.

1. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.

G. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:

1. Prime surface of concrete deck with asphalt primer at rate of 3/4 gal./100 sq. ft. (0.3 L/sq. m), and allow primer to dry.
2. Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F (14 deg C) of equiviscous temperature.
3. Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
4. Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

H. Mechanically Fastened Insulation: Install each layer of 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 requirements in FM Global's "RoofNav" for specified Windstorm Resistance Classification.
2. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.

I. Mechanically Fastened and Adhered Insulation: Install each layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Fasten first layer of insulation according to requirements in FM Global's "RoofNav" for specified Windstorm Resistance Classification.
2. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
3. Set each subsequent layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F (14 deg C) of equiviscous temperature.
4. Set each subsequent layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
5. Set each subsequent layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

3.5 ADHERED ROOFING INSTALLATION

A. Adhere roofing over area to receive roofing according to roofing system manufacturer's written instructions. Unroll roofing and allow to relax before retaining.

B. Start installation of roofing in presence of roofing system manufacturer's technical personnel.

C. Accurately align roofing, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Bonding Adhesive: Apply to substrate and underside of roofing at rate required by manufacturer, and allow to partially dry before installing roofing. Do not apply to splice area of roofing.

E. In addition to adhering, mechanically fasten roofing securely at terminations, penetrations, and perimeter of roofing.

F. Apply roofing with side laps shingled with slope of roof deck where possible.

G. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roofing and sheet flashings according to manufacturer's written instructions, to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet.
2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
3. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.

H. Spread sealant bed over deck-drain flange at roof drains, and securely seal roofing in place with clamping ring.

3.6 MECHANICALLY FASTENED ROOFING INSTALLATION

A. Mechanically fasten roofing over area to receive roofing according to roofing system manufacturer's written instructions. Unroll roofing and allow to relax before retaining.

1. For in-splice attachment, install roofing with long dimension perpendicular to steel roof deck flutes.

B. Start installation of roofing in presence of roofing system manufacturer's technical personnel.

C. Accurately align roofing, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Mechanically fasten or adhere roofing securely at terminations, penetrations, and perimeter of roofing.

E. Apply roofing with side laps shingled with slope of roof deck where possible.

F. In-Seam Attachment: Secure one edge of TPO sheet using fastening plates or metal battens centered within seam, and mechanically fasten TPO sheet to roof deck.

G. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet.
2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
3. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.

H. Spread sealant bed over deck-drain flange at roof drains, and securely seal roofing in place with clamping ring.

3.7 BASE FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.8 WALKWAY INSTALLATION

A. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components, and to furnish reports to Architect.

B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.

C. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.10 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.11 ROOFING INSTALLER'S WARRANTY

A. WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

1. Owner: Lakes of Clermont
2. Address: <**Insert address**>.
3. Building Name/Type: <**Insert information**>.
4. Address: <**Insert address**>.
5. Area of Work: <**Insert information**>.
6. Acceptance Date: _____.
7. Warranty Period: 2 years.
8. Expiration Date: _____.

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:

    a. lightning;
    b. peak gust wind speed exceeding 100 mph (44.7 m/sec) ;
    c. fire;
    d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
    e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
    f. vapor condensation on bottom of roofing; and
    g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.

4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, _____.

1. Authorized Signature: _____.
2. Name: _____.
3. Title: _____.

END OF SECTION 075423

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Manufactured reglets with counterflashing.
2. Formed roof-drainage sheet metal fabrications.
3. Formed low-slope roof sheet metal fabrications.
4. Formed steep-slope roof sheet metal fabrications.
5. Formed wall sheet metal fabrications.
6. Formed equipment support flashing.
7. Formed overhead-piping safety pans.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood nailers, curbs, and blocking.
2. Section 073113 "Asphalt Shingles" for materials and installation of sheet metal flashing and trim integral with roofing.
3. Section 077100 "Roof Specialties" for manufactured copings, roof-edge specialties, roof-edge drainage systems, reglets, and counterflashings.
4. Section 077200 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.

1.3 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 noncorrosive installation.

1.4 ACTION SUBMITTALS

A. Product Data: For each of the following

1. Underlayment materials.
2. Elastomeric sealant.
3. Butyl sealant.

4. Epoxy seam sealer.

B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
8. Include details of roof-penetration flashing.
9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, flashings, and counterflashings.
10. Include details of special conditions.
11. Include details of connections to adjoining work.
12. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches (1:10).

C. Samples: For each exposed product and for each color and texture specified, 12 inches (300 mm) long by actual width.

D. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.

E. Samples for Verification: For each type of exposed finish.

1. Sheet Metal Flashing: 12 inches (300 mm) long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches (300 mm) long and in required profile. Include fasteners and other exposed accessories.
3. Unit-Type Accessories and Miscellaneous Materials: Full-size Sample.
4. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Product Certificates: For each type of coping and roof edge flashing that is ANSI/SPRI/FM 4435/ES-1 tested and FM Approvals approved.

C. Product Test Reports: For each product, for tests performed by a qualified testing agency.

D. Evaluation Reports: For copings and roof edge flashing, from an agency acceptable to authority having jurisdiction showing compliance with ANSI/SPRI/FM 4435/ES-1.

E. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

B. Special warranty.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: 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 ANSI/SPRI/FM 4435/ES-1 tested and FM Approvals approved, shop shall be listed as able to fabricate required details as tested and approved.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Build mockup of typical roof edge eave, including fascia, approximately 10 feet (3.0 m) long, including supporting construction cleats, seams, attachments, underlayment, and accessories.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner 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. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
2. Protect stored sheet metal flashing and trim from contact with water.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.9 WARRANTY

A. Special Warranty on Finishes: 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 Delta E units when tested in accordance with ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. 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:

1. Design Pressure: As indicated on Drawings.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 SHEET METALS

A. Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B209 (ASTM B209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
   1. As-Milled Finish: Mill in areas not visible to the public.
   2. Exposed Coil-Coated Finish:
      a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (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 for seacoast and severe environments.
   3. Color: As selected by Architect from manufacturer's full range.
   4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil (0.013 mm).

2.3 UNDERLAYMENT MATERIALS

A. Felt: ASTM D226/D226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.

B. Self-Adhering, High-Temperature Sheet Underlayment: Minimum 30 mils (0.76 mm) thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer in accordance with underlayment manufacturer's written instructions.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. ATAS International, Inc.
      b. Carlisle WIP Products; a brand of Carlisle Construction Materials.
      c. GCP Applied Technologies Inc.
      d. Henry Company.
      e. Owens Corning.
   2. Source Limitations: Obtain underlayment from single source from single manufacturer.
   3. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F (29 deg C) or lower.

C. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m) minimum.

2.4 MISCELLANEOUS MATERIALS

A. Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
b. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.
c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.
4. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel in accordance with ASTM A153/A153M or ASTM F2329.
5. Fasteners for Zinc Sheet: Series 300 stainless steel or hot-dip galvanized steel in accordance with ASTM A153/A153M or ASTM F2329.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

D. Elastomeric Sealant: ASTM C920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

G. Bituminous Coating: Cold-applied asphalt emulsion in accordance with ASTM D1187/D1187M.

H. Asphalt Roofing Cement: ASTM D4586, asbestos free, of consistency required for application.

I. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Fry Reglet Corporation.

2. Source Limitations: Obtain reglets from single source from single manufacturer.
3. Material: Stainless steel, 0.0188 inch (0.477 mm) thick.
4. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
5. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
6. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
7. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
8. Accessories:

    a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
    b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.

9. Finish: With manufacturer's standard color coating.

2.5 FABRICATION, GENERAL

A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.

1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
2. 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.
3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances:

1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.
2. Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified.

C. 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 (25 mm) deep, filled with butyl sealant concealed within joints.

2. Use lapped expansion joints only where indicated on Drawings.

D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

G. Seams:

1. Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
2. Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
3. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

H. Do not use graphite pencils to mark metal surfaces.

2.6 ROOF-DRAINAGE SHEET METAL FABRICATIONS

A. Hanging Gutters:

1. Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required.
2. Fabricate in minimum 96-inch- (2400-mm-) long sections.
3. Furnish flat-stock gutter brackets and flat-stock gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard, but with thickness not less than twice the gutter thickness.
4. Fabricate expansion joints, expansion-joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters. Shop fabricate interior and exterior corners.
5. Gutter Profile: Style K in accordance with cited sheet metal standard.
6. Expansion Joints: Butt type with cover plate.
7. Accessories: Wire-ball downspout strainer Valley baffles.
8. Gutters with Girth up to 15 Inches (380 mm): Fabricate from the following materials:
   a. Aluminum: 0.032 inch (0.81 mm) thick.

9. Gutters with Girth 16 to 20 Inches (410 to 510 mm): Fabricate from the following materials:
   a. Aluminum: 0.040 inch (1.02 mm) thick.

B. Downspouts: Fabricate rectangular downspouts to dimensions indicated on Drawings, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors.

1. Fabricated Hanger Style: [**Fig. 1-35A**] [**Fig. 1-35B**] [**Fig. 1-35C**] [**Fig. 1-35D**] [**Fig. 1-35E**] [**Fig. 1-35F**] [**Fig. 1-35G**] [**Fig. 1-35H**] [**Fig. 1-35I**] [**Fig. 1-35J**] in accordance with SMACNA's "Architectural Sheet Metal Manual."
2. Manufactured Hanger Style: [**Fig. 1-34A**] [**Fig. 1-34B**] [**Fig. 1-34C**] [**Fig. 1-34D**] [**Fig. 1-34E**] in accordance with SMACNA's "Architectural Sheet Metal Manual."
3. Hanger Style: <**Insert description**>.
4. Fabricate from the following materials:
   a. Aluminum: 0.024 inch (0.61 mm) thick.

C. Parapet Scuppers: Fabricate scuppers to dimensions required, with closure flange trim to exterior, 4-inch- (100-mm-) wide wall flanges to interior, and base extending 4 inches (100 mm) beyond cant or tapered strip into field of roof. Fabricate from the following materials:
1. Aluminum: 0.032 inch (0.81 mm) thick.

D. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape required, complete with outlet tubes, exterior flange trim, and built-in overflows. Fabricate from the following materials:
1. Aluminum: 0.032 inch (0.81 mm) thick.

E. Splash Pans: Fabricate to dimensions and shape required and from the following materials:
1. Aluminum: 0.040 inch (1.02 mm) thick.

2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Roof Edge Flashing (Gravel Stop) and Fascia Cap: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long sections. Furnish with 6-inch- (150-mm-) wide, joint cover plates. Shop fabricate interior and exterior corners.

1. Joint Style: Butted with expansion space and 6-inch- (150-mm-) wide, concealed backup plate.
2. Fabricate from the following materials:
   a. Aluminum: 0.050 inch (1.27 mm) thick.

B. Copings: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and interior leg. Miter corners, fasten and seal watertight. Shop fabricate interior and exterior corners.

1. Coping Profile: [**Fig. 3-4A**] [**Fig. 3-4B**] [**Fig. 3-4C**] [**Fig. 3-4D**] [**Fig. 3-4E**] [**Fig. 3-4F**] [**Fig. 3-4G**] in accordance with SMACNA's "Architectural Sheet Metal Manual."
2. Joint Style: Butted with expansion space and 6-inch- (150-mm-) wide, concealed backup plate.
3. Fabricate from the following materials:
   a. Aluminum: 0.050 inch (1.27 mm) thick.

C. Roof and Roof-to-Wall Transition Roof-to-Roof Edge-Flashing (Gravel-Stop) Transition Roof-to-Roof Edge-Flashing (Gravel-Stop) and Fascia-Cap Transition Expansion-Joint Cover: Shop fabricate interior and exterior corners. Fabricate from the following materials:
1. Aluminum: 0.050 inch (1.27 mm) thick.

D. Base Flashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
1. Aluminum: 0.040 inch (1.02 mm) thick.

E. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
1. Aluminum: 0.032 inch (0.81 mm) thick.

F. Flashing Receivers: Fabricate from the following materials:
1. Aluminum: 0.032 inch (0.81 mm) thick.

G. Roof-Penetration Flashing: Fabricate from the following materials:
1. Stainless Steel: 0.0188 inch (0.477 mm) thick when roof membrane manufacturer does not offer matching manufactured system.

2.8 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials:
1. Aluminum: 0.032 inch (0.81 mm) thick.

B. Drip Edges: Fabricate from the following materials:
1. Aluminum: 0.032 inch (0.81 mm) thick.

C. Eave, Rake, Ridge, and Hip Flashing: Fabricate from the following materials:
1. Aluminum: 0.032 inch (0.81 mm) thick.

D. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
1. Aluminum: 0.032 inch (0.81 mm) thick.

E. Flashing Receivers: Fabricate from the following materials:
1. Aluminum: 0.032 inch (0.81 mm) thick.

F. Roof-Penetration Flashing: Fabricate from the following materials:
1. Galvanized Steel: 0.028 inch (0.71 mm) thick.

2.9 WALL SHEET METAL FABRICATIONS

A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches (150 mm) beyond each side of wall openings; and form with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials:
1. Stainless Steel: 0.0156 inch (0.396 mm) thick.

B. Opening Flashings in Frame Construction: Fabricate head, sill, and similar flashings to extend 4 inches (100 mm) beyond wall openings. Form head and sill flashing with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials:
   1. Aluminum: 0.032 inch (0.81 mm) thick.

C. Wall Expansion-Joint Cover: Fabricate from the following materials:
   1. Aluminum: 0.040 inch (1.02 mm) thick.

2.10 MISCELLANEOUS SHEET METAL FABRICATIONS

A. Equipment Support Flashing: Fabricate from the following materials:
   1. Stainless Steel: 0.0188 inch (0.477 mm) thick.

B. Overhead-Piping Safety Pans: Fabricate from the following materials:
   1. Galvanized Steel: 0.040 inch (1.02 mm) thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances, substrate, 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. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF UNDERLAYMENT

A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim.

   1. Install in shingle fashion to shed water.
   2. Lap joints not less than 2 inches (50 mm).

B. Synthetic Underlayment: Install synthetic underlayment, wrinkle free, in accordance with manufacturers' written instructions, and using adhesive where possible to minimize use of mechanical fasteners under sheet metal.

   1. Lap horizontal joints not less than 4 inches (100 mm).
   2. Lap end joints not less than 12 inches (300 mm).

C. Self-Adhering, High-Temperature Sheet Underlayment:

1. Install self-adhering, high-temperature sheet underlayment; wrinkle free.
2. Prime substrate if recommended by underlayment manufacturer.
3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
4. Apply in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses.
5. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps and edges with roller.
6. Roll laps and edges with roller.
7. Cover underlayment within 14 days.

D. Install slip sheet, wrinkle free, over underlayment before installing sheet metal flashing and trim.

1. Install in shingle fashion to shed water.
2. Lapp joints not less than 4 inches (100 mm).

3.3 INSTALLATION, GENERAL

A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.

1. Install fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds or sealant.
3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
5. Install continuous cleats with fasteners spaced not more than 12 inches (300 mm) o.c.
6. Space individual cleats not more than 12 inches (300 mm) apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
8. Do not field cut sheet metal flashing and trim by torch.
9. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of uncoated-aluminum and stainless steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.

1. Space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.
2. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
3. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated.

    a. Embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant.
    b. Form joints to completely conceal sealant.
    c. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way.
    d. Adjust setting proportionately for installation at higher ambient temperatures.

        1) Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).

2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter.

1. Pretin edges of sheets with solder to width of 1-1/2 inches (38 mm); however, reduce pretinning where pretinned surface would show in completed Work.
2. Do not solder metallic-coated steel and aluminum sheet.
3. Do not use torches for soldering.
4. Heat surfaces to receive solder, and flow solder into joint.

    a. Fill joint completely.
    b. Completely remove flux and spatter from exposed surfaces.

5. Stainless Steel Soldering:

    a. Tin edges of uncoated sheets, using solder for stainless steel and acid flux.
    b. Promptly remove acid-flux residue from metal after tinning and soldering.
    c. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

H. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

3.4 INSTALLATION OF ROOF-DRAINAGE SYSTEM

A. Install sheet metal roof-drainage items to produce complete roof-drainage system in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.

B. Hanging Gutters:

1. Join sections with riveted and soldered joints or joints sealed with sealant.
2. Provide for thermal expansion.
3. Attach gutters at eave or fascia to firmly anchor them in position.
4. Provide end closures and seal watertight with sealant.
5. Slope to downspouts.
6. Fasten gutter spacers to front and back of gutter.
7. Anchor and loosely lock back edge of gutter to continuous cleat, eave or apron flashing.
8. Anchor gutter with gutter brackets spaced not more than 30 inches (760 mm) apart to roof deck unless otherwise indicated, and loosely lock to front gutter bead.
9. Install gutter with expansion joints at locations indicated on Drawings, but not exceeding, 50 feet (15.2 m) apart. Install expansion-joint caps.

C. Downspouts:

1. Join sections with 1-1/2-inch (38-mm) telescoping joints.
2. Provide hangers with fasteners designed to hold downspouts securely to walls.
3. Locate hangers at top and bottom and at approximately 60 inches (1500 mm) o.c.
4. Provide elbows at base of downspout to direct water away from building.
5. Connect downspouts to underground drainage system.

D. Splash Pans:

1. Install where downspouts discharge on low-slope roofs.
2. Set in elastomeric sealant compatible with the substrate.

E. Parapet Scuppers:

1. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
2. Anchor scupper closure trim flange to exterior wall and solder or seal with elastomeric sealant to scupper.
3. Loosely lock front edge of scupper with conductor head.
4. Solder or seal with elastomeric sealant exterior wall scupper flanges into back of conductor head.

F. Conductor Heads: Anchor securely to wall, with elevation of conductor head rim at minimum of 1 inch (25 mm) below scupper or gutter discharge.

G. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated on Drawings. Lap joints minimum of 4 inches (100 mm) in direction of water flow.

3.5 INSTALLATION OF ROOF FLASHINGS

A. Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard.

1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing:

1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.
2. Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch (75-mm) centers.
3. Anchor to resist uplift and outward forces in accordance with recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm classification.

C. Copings:

1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.
2. Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated.

    a. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 24-inch (600-mm) centers.
    b. Anchor interior leg of coping with washers and screw fasteners through slotted holes at 24-inch (600-mm) centers.

3. Anchor to resist uplift and outward forces in accordance with recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for specified FM Approvals' listing for required windstorm classification.

D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches (100 mm) over base flashing. Install stainless steel draw band and tighten.

E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.

1. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
2. Extend counterflashing 4 inches (100 mm) over base flashing.
3. Lap counterflashing joints minimum of 4 inches (100 mm).
4. Secure in waterproof manner by means of interlocking folded seam or blind rivets and sealant unless otherwise indicated.

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.

3.6 INSTALLATION OF WALL FLASHINGS

A. Install sheet metal wall flashing to intercept and exclude penetrating moisture in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches (100 mm) beyond wall openings.

C. Reglets: Installation of reglets is specified in Section 042000 "Unit Masonry."

3.7 INSTALLATION OF MISCELLANEOUS FLASHING

A. Equipment Support Flashing:

1. Coordinate installation of equipment support flashing with installation of roofing and equipment.
2. Weld or seal flashing with elastomeric sealant to equipment support member.

B. Overhead-Piping Safety Pans:

1. Suspend pans from structure above, independent of other overhead items such as equipment, piping, and conduit, unless otherwise indicated on Drawings.
2. Pipe and install drain line to plumbing waste or drainage system.

3.8 INSTALLATION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.9 CLEANING

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.

3.10 PROTECTION

A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

B. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended in writing by sheet metal flashing and trim manufacturer.

C. Maintain sheet metal flashing and trim in clean condition during construction.

D. 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, as determined by Architect.

END OF SECTION 076200

SECTION 076521

VINYL DECORATIVE MONOLITHIC

DOOR AND WINDOW FLASHING SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Manufactured PVC vinyl extrusions, fused in 4 corners, to form a perimeter flashing system for doors and windows.

B. Related Requirements:

1. Section 061000 Rough Carpentry for wood nailers, curbs, and blocking.

2. Section 085313 Vinyl Windows

3. Section 081113 Metal Doors and Frames

4. Section 084229 Automatic Entry Doors

5. Section 092400 Cement Plaster

1.3 COORDINATION

A. Coordinate flashing systems with layout, type, locations and sizes of openings to be flashed.

B. Coordinate flashing system installations with adjoining wall materials, so as to provide leak-proof and secure installation.

1.4 ACTION SUBMITTALS

A. Product Data: For each type and size system.

1. Include details and dimensions of profiles for each manufactured assembly.

B. Shop Drawings: For each size flashing system.

1. Include plans, elevations, sections, and attachment details.
2. Distinguish between shop- and field-assembled work.
3. Include details for joining, supporting, and securing, including layout and spacing of fasteners, clips or other attachments.
4. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
5. Include details of special conditions.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not store flashing systems in contact with other materials that might cause staining, denting, or other surface damage. Store flashing system materials away from uncured concrete and masonry.

B. Provide protective covering of flashing systems to the extent necessary, to prevent staining and marring prior to installation.

1.6 WARRANTY

A. Provide Manufacturer’s Life-Time warranty

PART 2 - PRODUCTS

2.1 Product Name: Deco-Flash

A. Manufacturer address: Deco Flash, LLC, 4717 Oak Fair Blvd., Tampa, FL 33605

Manufacturer’s Telephone Number: (813) 397-2827

2.2 PERFORMANCE REQUIREMENTS

A. General: Window and door Decorative flashing systems 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 flashing systems and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealant, 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.

2.3 PRODUCT DESCRIPTION

A. Deco-Flash is a decorative, monolithic flashing system made of a single vinyl chambered extrusion that is fused in all four corners, designed to prevent leaks on all sides of doors and windows, when installed in accordance with the manufacturer's instructions.

B. All chambered extrusions are .075" thick and when fused together form an effective vapor and air barrier system. Since vinyl is predominantly a neutral composition it does not chemically react with most materials used in the construction industry.

2.4 TECHNICAL DATA

A. Miami-Dade County NOA 12-1120.02

B. Extrusions shall meet ASTM D 4726, classification (ASTM D 4216) 1-10454-33-0000, 1-20131-13-0000, or 1-4131-13 and the following properties: Rate of Burning (ASTM D-635) Class C1.

C. Self-ignition Temperature (ASTM D1929) 925 Deg. F>650 Deg. F.

D. Average Smoke Density Rating (ASTM D 2843) 43%<

E. 75% - Flame Spread Index (ASTM E84) 26.2% < 75%

F. Tensile Strength (difference: Exposed & Underexposed) Exposed per Section 2612 of The Florida Building Code (ASTM D 638) 4.98% < 10

G. Product Engineering/Evaluation Report (available on www.DecoFlash.com)

H. Comply with AMMA 800, ASTM C 920 Class 25 Grade NS or greater for proper joint expansion and contraction.

2.5 FABRICATION, GENERAL

A. General: Custom fabricate door and window Decorative Flashing Systems to comply with R.O. sizes shown and scheduled on the drawings.
   1. Obtain field measurements for accurate fit before shop fabrication.
   2. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances: Fabricate flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, for compliance with requirements for installation tolerances, substrate, 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, and securely anchored.
3. Verify that air- or water-resistant barriers have been installed over substrate to prevent air infiltration or water penetration where required.

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

3.2 INSTALLATION, GENERAL

A. Install Decorative Door and Window flashing systems in accordance with the manufacturer's instructions. Use fasteners, protective coatings, tape, sealants, and other miscellaneous items as required.

END OF SECTION 076200

SECTION 077100 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Copings.
2. Roof-edge specialties.
3. Roof-edge drainage systems.
4. Reglets and counterflashings.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood nailers, curbs, and blocking.
2. Section 076200 "Sheet Metal Flashing and Trim" for custom- and site-fabricated sheet metal flashing and trim.
3. Section 077200 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.
4. Section 079200 "Joint Sealants" for field-applied sealants between roof specialties and adjacent materials.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof specialties.

1. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.
2. Include details for expansion and contraction; locations of expansion joints, including direction of expansion and contraction.
3. Indicate profile and pattern of seams and layout of fasteners, cleats, clips, and other attachments.
4. Detail termination points and assemblies, including fixed points.
5. Include details of special conditions.

C. Samples: For each type of roof specialty and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer.

B. Product Certificates: For each type of roof specialty.

C. Product Test Reports: For copings and roof-edge flashings, for tests performed by a qualified testing agency.

D. Sample Warranty: For manufacturer's special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing specialties to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer offering products meeting requirements that are FM Approvals listed for specified class and SPRI ES-1 tested to specified design pressure.

B. Source Limitations: Obtain roof specialties approved by manufacturer providing roofing-system warranty specified in Section 073113 – “Asphalt Shingles” and 075423 – “Thermoplastic Polyolefin (TPO) Roofing”.

C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and set quality standards for fabrication and installation.
1. Build mockup of typical roof edge, including fascia gutter and downspout, approximately 10 feet (3.0 m) long, including supporting construction, seams, attachments, underlayment, and accessories.
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.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.

B. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof-specialty installation.

1.8 FIELD CONDITIONS

A. Field Measurements: Verify profiles and tolerances of roof-specialty substrates by field measurements before fabrication, and indicate measurements on Shop Drawings.

B. Coordination: Coordinate roof specialties with flashing, trim, and construction of parapets, roof deck, roof and wall panels, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.9 WARRANTY

A. Roofing-System Warranty: Roof specialties are included in warranty provisions in Section 073113 "Asphalt Shingles" and 075423 “Thermoplastic-Polyolefin (TPO) Roofing”.

B. Special Warranty on Painted Finishes: Manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Roof specialties shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. FM Approvals' Listing: Manufacture and install copings roof-edge specialties that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-105. Identify materials with FM Approvals' markings.

C. SPRI Wind Design Standard: Manufacture and install copings roof-edge specialties tested according to SPRI ES-1 and capable of resisting the following design pressures:

1. Design Pressure: As indicated on Structural Drawings.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 COPINGS

A. Metal Copings: Manufactured coping system consisting of metal coping cap in section lengths not exceeding 12 feet (3.6 m), concealed anchorage; with corner units, end cap units, and concealed splice plates with finish matching coping caps.

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. ATAS International, Inc.
   b. PAC-CLAD; Petersen Aluminum Corporation; a Carlisle company.

2. Formed Aluminum Sheet Coping Caps: Aluminum sheet, 0.050 inch (1.27 mm) thick.

   a. Surface: Smooth, flat finish.
   b. Finish: Three-coat fluoropolymer.
   c. Color: Match Architect's sample.

3. Corners: Factory mitered and mechanically clinched and sealed watertight.
4. Coping-Cap Attachment Method: Snap-on or face leg hooked to continuous cleat with back leg fastener exposed, fabricated from coping-cap material.

   a. Snap-on Coping Anchor Plates: Concealed, galvanized-steel sheet, 12 inches (300 mm) wide, with integral cleats.
   b. Face-Leg Cleats: Concealed, continuous galvanized-steel sheet.

2.3 ROOF-EDGE SPECIALTIES

A. Canted Roof-Edge Fascia and Gravel Stop: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet (3.6 m) and a continuous formed galvanized-steel sheet cant, 0.028 inch (0.71 mm) thick, minimum, with extended vertical leg terminating in a drip-edge cleat. Provide matching corner units.

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. ATAS International, Inc.
   b. PAC-CLAD; Petersen Aluminum Corporation; a Carlisle company.

2. Formed Aluminum Sheet Fascia Covers: Aluminum sheet, 0.050 inch (1.27 mm) thick.

   a. Surface: Smooth, flat finish.
   b. Finish: Two-coat fluoropolymer.
   c. Color: As selected by Architect from manufacturer's full range.

3. Corners: Factory mitered and mechanically clinched and sealed watertight.
4. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.
5. Fascia Accessories: Fascia extenders with continuous hold-down cleats Wall cap.

B. Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet (3.6 m) and a continuous metal receiver with integral drip-edge cleat to engage fascia cover and secure single-ply roof membrane. Provide matching corner units.

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. ATAS International, Inc.

2. Formed Aluminum Sheet Fascia Covers: Aluminum sheet, 0.050 inch (1.27 mm) thick.

a. Surface: Smooth, flat finish.
b. Finish: Two-coat fluoropolymer.
c. Color: As selected by Architect from manufacturer's full range.

3. Corners: Factory mitered and mechanically clinched and sealed watertight.
4. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.
5. Receiver: Galvanized-steel sheet, nominal 0.040-inch (1.02-mm) thickness.
6. Fascia Accessories: Fascia extenders with continuous hold-down cleats Wall cap Soffit trim.

C. One-Piece Gravel Stops: Manufactured, one-piece, metal gravel stop in section lengths not exceeding 12 feet (3.6 m), with a horizontal flange and vertical leg, drain-through fascia terminating in a drip edge, and concealed splice plates of same material, finish, and shape as gravel stop. Provide matching corner units.

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. PAC-CLAD; Petersen Aluminum Corporation; a Carlisle company.

2. Formed Aluminum Sheet Gravel Stops: Aluminum sheet, 0.050 inch (1.27 mm) thick.

a. Surface: Smooth, flat finish.
b. Finish: Two-coat fluoropolymer.
c. Color: As selected by Architect from manufacturer's full range.

3. Corners: Factory mitered and mechanically clinched and sealed watertight.
4. Accessories: Fascia extenders with continuous hold-down cleats Wall cap.

2.4 ROOF-EDGE DRAINAGE SYSTEMS

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. ATAS International, Inc.

B. Gutters: Manufactured in uniform section lengths not exceeding 20 feet (6.1 m), with matching corner units, ends, outlet tubes, and other accessories. Elevate back edge at least 1 inch (25 mm) above front edge. Furnish flat-stock gutter straps, gutter brackets, expansion joints, and expansion-joint covers fabricated from same metal as gutters.
1. Aluminum Sheet: 0.040 inch (1.02 mm) thick.
2. Gutter Profile: Style K according to SMACNA's "Architectural Sheet Metal Manual."
3. Corners: Factory mitered and mechanically clinched and sealed watertight.
4. Gutter Supports: Gutter brackets with finish matching the gutters.
5. Gutter Accessories: Wire ball downspout strainer Flat ends.

C. Downspouts: Corrugated rectangular complete with machine-crimped elbows, manufactured from the following exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors.
1. Formed Aluminum: 0.040 inch (1.02 mm) thick.

D. Aluminum Finish: Two-coat fluoropolymer.

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

2.5 REGLETS AND COUNTERFLASHINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ATAS International, Inc.
2. Fry Reglet Corporation.

B. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:

1. Zinc-Coated Steel: Nominal 0.028-inch (0.71-mm) thickness.
2. Corners: Factory mitered and mechanically clinched and sealed watertight.
3. Surface-Mounted Type: Provide reglets with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
4. Stucco Type, Embedded: Provide reglets with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
5. Concrete Type, Embedded: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
6. Masonry Type, Embedded: Provide reglets with offset top flange for embedment in masonry mortar joint.
7. Multiuse Type, Embedded: For multiuse embedment in masonry mortar joints.

C. Counterflashings: Manufactured units of heights to overlap top edges of base flashings by 4 inches (100 mm) and in lengths not exceeding 12 feet (3.6 m) designed to snap into reglets or through-wall-flashing receiver and compress against base flashings with joints lapped, from the following exposed metal:
1. Formed Aluminum: 0.032 inch (0.81 mm) thick.

D. Accessories:

1. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where reglet is provided separate from metal counterflashing.
2. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

E. Zinc-Coated Steel Finish: Two-coat fluoropolymer.

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

F. Aluminum Finish: Two-coat fluoropolymer.

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

2.6 MATERIALS

A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, G90 (Z275) coating designation.

B. Aluminum Sheet: ASTM B209 (ASTM B209M), alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

C. Aluminum Extrusions: ASTM B221 (ASTM B221M), alloy and temper recommended by manufacturer for type of use and finish indicated, finished as follows:

D. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304.

2.7 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils (0.76 to 1.0 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Carlisle WIP Products; a brand of Carlisle Construction Materials.
b. GCP Applied Technologies Inc.
c. Henry Company.

2. Thermal Stability: ASTM D1970/D1970M; stable after testing at 240 deg F (116 deg C).
3. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F (29 deg C).

2.8 MISCELLANEOUS MATERIALS

A. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:

1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
2. Fasteners for Copper Sheet: Copper, hardware bronze, or passivated Series 300 stainless steel.
3. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.
4. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.
5. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A153/A153M or ASTM F2329.

B. Elastomeric Sealant: ASTM C920, elastomeric silicone polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.

C. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type joints with limited movement.

D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

E. Asphalt Roofing Cement: ASTM D4586, asbestos free, of consistency required for application.

2.9 FINISHES

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

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are 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.

D. Coil-Coated Galvanized-Steel Sheet Finishes:

1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with ASTM A755/A755M and coating and resin manufacturers' written instructions.

    a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (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 for seacoast and severe environments.
    b. Concealed Surface Finish: Apply pretreatment and manufacturer's standard acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

E. Coil-Coated Aluminum Sheet Finishes:

1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (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 for seacoast and severe environments.
b. Concealed Surface Finish: Apply pretreatment and manufacturer's standard acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

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.

B. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.

C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage where applicable, and securely anchored.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF UNDERLAYMENT

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches (152 mm) staggered 24 inches (610 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps with roller. Cover underlayment within 14 days.

1. Apply continuously under copings roof-edge specialties and reglets and counterflashings.
2. Coordinate application of self-adhering sheet underlayment under roof specialties with requirements for continuity with adjacent air barrier materials.

3.3 INSTALLATION, GENERAL

A. Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.

1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
2. Provide uniform, neat seams with minimum exposure of solder and sealant.
3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
4. Torch cutting of roof specialties is not permitted.
5. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.

C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.

1. Space movement joints at a maximum of 12 feet (3.6 m) with no joints within 18 inches (450 mm) of corners or intersections unless otherwise indicated on Drawings.
2. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

D. Fastener Sizes: Use fasteners of sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.

E. Seal concealed joints with butyl sealant as required by roofing-specialty manufacturer.

F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F (4 deg C).

3.4 INSTALLATION OF COPINGS

A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor copings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at manufacturer's required spacing that meets performance requirements.
2. Interlock face-leg drip edge into continuous cleat anchored to substrate at manufacturer's required spacing that meets performance requirements. Anchor back leg of coping with screw fasteners and elastomeric washers at manufacturer's required spacing that meets performance requirements.

3.5 INSTALLATION OF ROOF-EDGE SPECIALITIES

A. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

3.6 INSTALLATION OF ROOF-EDGE DRAINAGE-SYSTEM

A. Install components to produce a complete roof-edge drainage system according to manufacturer's written instructions. Coordinate installation of roof perimeter flashing with installation of roof-edge drainage system.

B. Gutters: Join and seal gutter lengths. Allow for thermal expansion. Attach gutters to firmly anchored gutter supports spaced not more than 24 inches (610 mm) apart. Attach ends with rivets and seal with sealant to make watertight. Slope to downspouts.

1. Install gutter with expansion joints at locations indicated but not exceeding 50 feet (15.2 m) apart. Install expansion-joint caps.

C. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and 1 inch (25 mm) away from walls; locate fasteners at top and bottom and at approximately 60 inches (1500 mm) o.c.

1. Provide elbows at base of downspouts at grade to direct water away from building.
2. Connect downspouts to underground drainage system indicated.

3.7 INSTALLATION OF REGLETS AND COUNTERFLASHINGS

A. Coordinate installation of reglets and counterflashings with installation of base flashings.

B. Embedded Reglets: See Section 042000 "Unit Masonry" for installation of reglets.

C. Surface-Mounted Reglets: Install reglets to receive flashings where flashing without embedded reglets is indicated on Drawings. Install at height so that inserted counterflashings overlap 4 inches (100 mm) over top edge of base flashings.

D. Counterflashings: Insert counterflashings into reglets or other indicated receivers; ensure that counterflashings overlap 4 inches (100 mm) over top edge of base flashings. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with butyl sealant. Fit counterflashings tightly to base flashings.

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 and sealants.

C. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.

D. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077100

SECTION 077129 - MANUFACTURED ROOF EXPANSION JOINTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Flanged bellows-type roof expansion joints.
2. Extruded bellows roof expansion joints.
3. Aluminum roof expansion joints.
4. Preformed foam sealant-type roof expansion joints.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wooden curbs or cants for mounting roof expansion joints.
2. Section 076200 "Sheet Metal Flashing and Trim" for shop- and field-fabricated sheet metal expansion-joint systems, flashing, and other sheet metal items.
3. Section 077200 "Roof Accessories" for manufactured and prefabricated metal roof curbs.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For roof expansion joints.

1. Include plans, elevations, sections, and attachment details.
2. Include details of splices, intersections, transitions, fittings, method of field assembly, and location and size of each field splice.
3. Provide isometric drawings of intersections, terminations, changes in joint direction or planes, and transition to other expansion joint systems depicting how components interconnect with each other and adjacent construction to allow movement and achieve waterproof continuity.

C. Samples: For each exposed product and for each color specified, 6 inches (150 mm) in size.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each fire-barrier provided as part of a roof-expansion-joint assembly, for tests performed by a qualified testing agency.

C. Sample Warranties: For special warranties.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Installer of roofing membrane.

1.6 WARRANTY

A. Special Warranty: Manufacturer and Installer agree to repair or replace roof expansion joints and components that leak, deteriorate beyond normal weathering, or otherwise fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five (5) years from date of Substantial Completion.

B. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof expansion joints that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint seals, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

B. Fire-Resistance Rating: Comply with ASTM E1966 or UL 2079; testing by a qualified testing agency to resist the spread of fire and to accommodate building thermal and seismic movements without impairing its ability to resist the passage of fire and hot gases. Identify products with appropriate markings of applicable testing agency.

1. Rating: Not less than fire-resistance rating of the roof assembly.
2. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 FLANGED BELLOWS-TYPE ROOF EXPANSION JOINTS (REJ-1)

A. Flanged Bellows-Type Roof Expansion Joint: Factory-fabricated, continuous, waterproof, joint cover consisting of exposed membrane bellows laminated to flexible, closed-cell support foam, and secured along each edge to 3- to 4-inch- (76- to 100-mm-) wide metal flange.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Balco; a CSW Industrials Company.
    b. C/S Group.
    c. Inpro Corporation.
    d. MM Systems Corporation.
2. Source Limitations: Obtain flanged bellows-type roof expansion joints approved by roofing manufacturer and that are part of roofing membrane warranty.
3. Joint Movement Capability: Plus and minus 50 percent of joint size.
4. Bellows: TPO flexible membrane, nominal 60 mils (1.5 mm) thick.
5. Flanges: Aluminum, 0.032 inch (0.81 mm) thick.
6. Configuration: Angle formed to fit curbs as indicated on Drawings.
7. Corner, Intersection, and Transition Units: Provide factory-fabricated units for corner and joint intersections and horizontal and vertical transitions including those to other building expansion joints.
8. Cover Membrane: TPO flexible membrane, factory laminated to bellows and covering entire joint assembly and curbs.
    a. Color: White.
9. Accessories: Provide splicing units, adhesives, and other components as recommended by roof-expansion-joint manufacturer for complete installation.
10. Fire Barrier: Manufacturer's standard fire barrier for fire-resistance-rated expansion joint system.

B. Materials:
1. Aluminum Sheet: ASTM B209 (ASTM B209M), mill finish, with temper to suit forming operations and performance required.
    a. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious or preservative-treated wood materials.
2. EPDM Membrane: ASTM D4637/D4637M, type standard with manufacturer for application.
3. Neoprene Membrane: Neoprene sheet recommended by EPDM manufacturer for resistance to hydrocarbons, non-aromatic solvents, grease, and oil; and as standard with roof-expansion-joint manufacturer for application.
4. PVC Membrane: ASTM D4434/D4434M, type standard with manufacturer for application.

2.3 ALUMINUM ROOF EXPANSION JOINTS (REJ-2)

A. Aluminum Roof Expansion Joint: Factory-fabricated, continuous, waterproof, joint cover; consisting of a formed or extruded metal cover secured to extruded aluminum frames, with water-resistant gasketing between cover and frames, and with provision for securing assembly to substrate and sealing assembly to roofing membrane or flashing.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Balco; a CSW Industrials Company.
    b. C/S Group.
    c. Inpro Corporation.
    d. MM Systems Corporation.
2. Joint Movement Capability: Plus and minus 50 percent of joint size.
3. Frame Members: Extruded aluminum configured for curbs as indicated; with exposed finish as selected by Architect from manufacturer's full range.
4. Cover: Formed or extruded aluminum; thickness as recommended by manufacturer.
5. Centering Devices: Centering bars.
6. Corner, Intersection, and Transition Units: Provide factory-fabricated units for corner and joint intersections and horizontal and vertical transitions including those to other building expansion joints.
7. Accessories: Provide splicing units, adhesives, and other components as recommended by roof-expansion-joint manufacturer for complete installation.
8. Secondary Seal: Continuous, waterproof membrane within joint and attached to substrate on sides of joint below the cover.
    a. Drain-Tube Assemblies: Equip secondary seal with drain tubes and seals to direct collected moisture to exterior-wall expansion joint cover.
9. Fire Barrier: Manufacturer's standard fire barrier for fire-resistance-rated expansion joint system.

B. Materials:

1. Aluminum: ASTM B209 (ASTM B209M) for sheet and plate, ASTM B221 (ASTM B221M) for extrusions; alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.
    a. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious or preservative-treated wood materials.
    b. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
        1) Three-Coat Fluoropolymer: System consisting of primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent PVDF resin by weight.
    c. Aluminum Finish Color: As selected by Architect from manufacturer's full range.

2.4 MISCELLANEOUS MATERIALS

A. Adhesives: As recommended by roof-expansion-joint manufacturer.

B. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to withstand design loads.

1. Exposed Fasteners: Gasketed. Use screws with hex washer heads matching color of material being fastened.

C. Mineral-Fiber Blanket: ASTM C665.

D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joint openings, substrates, and expansion-control joint systems that interface with roof expansion joints, for suitable conditions where roof expansion joints will be installed.

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

3.2 INSTALLATION, GENERAL

A. Comply with manufacturer's written instructions for handling and installing roof expansion joints.

1. Anchor roof expansion joints securely in place, with provisions for required movement. Use fasteners, protective coatings, sealants, and miscellaneous items as required to complete roof expansion joints.
2. Install roof expansion joints true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
3. Provide for linear thermal expansion of roof-expansion-joint materials.
4. Provide uniform profile of roof expansion joint throughout its length; do not stretch or squeeze membranes.
5. Provide uniform, neat seams.
6. Install roof expansion joints to fit substrates and to result in watertight performance.

B. Directional Changes: Install factory-fabricated units at directional changes to provide continuous, uninterrupted, and watertight joints.

C. Transitions to Other Expansion-Control Joint Assemblies: Coordinate installation of roof expansion joints with other exterior expansion-control joint assemblies specified in Section 079513.16 "Exterior Expansion Joint Cover Assemblies" to result in watertight performance. Install factory-fabricated units at transitions between roof expansion joints and exterior expansion-control joint systems.

D. Splices: Splice roof expansion joints to provide continuous, uninterrupted, and waterproof joints.

1. Install waterproof splices and prefabricated end dams to prevent leakage of secondary-seal membrane.

E. Fire Barrier: Install fire barrier as required by manufacturer to provide continuous, uninterrupted fire resistance throughout length of roof expansion joint, including transitions and end joints.

F. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

END OF SECTION 077129

SECTION 077200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Equipment supports.
2. Roof hatches.
3. Pipe and duct supports.
4. Pipe portals.
5. Preformed flashing sleeves.
6. Roof walkways.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for metal vertical ladders, ships' ladders, and stairs for access to roof hatches.
2. Section 055213 "Pipe and Tube Railings" for safety railing systems not attached to roof-hatch curbs.
3. Section 076100 "Sheet Metal Roofing" for shop- and field-formed roof curbs and snow guards for sheet metal roofing.
4. Section 076200 "Sheet Metal Flashing and Trim" for shop- and field-formed metal flashing, roof-drainage systems, roof expansion-joint covers, and miscellaneous sheet metal trim and accessories.
5. Section 077100 "Roof Specialties" for manufactured fasciae, copings, gravel stops, gutters and downspouts, and counterflashing.
6. Section 077129 "Manufactured Roof Expansion Joints" for manufactured roof expansion-joint covers.
7. Section 077253 "Snow Guards" for snow guards.
8. Section 086200 "Unit Skylights" for single- and double-glazed domed plastic skylights with curb frame.
9. Section 230548 "Vibration and Seismic Controls for HVAC" for special curbs designed to accommodate seismic and vibration controls.
10. Section 233423 "HVAC Power Ventilators" for power roof-mounted ventilators.
11. Section 237413 "Packaged, Outdoor, Central-Station Air-Handling Units" for standard curbs specified with rooftop units.
12. [**Section 284621.11 "Addressable Fire-Alarm Systems"**] [**Section 28462.13 "Conventional Fire-Alarm Systems"**] for interconnects to automatically operated heat and smoke vents.

1.3 COORDINATION

A. Coordinate layout and installation of roof accessories with [**roofing membrane and base flashing and**]interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of roof accessory.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof accessories.

1. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.

C. Samples: For each exposed product and for each color and texture specified, prepared on Samples of size to adequately show color.

D. Delegated-Design Submittal: For [**roof curbs**] [**equipment supports**] [**and**] [**walkways**] 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 mounting, securing, and flashing of roof-mounted items to roof structure. Indicate coordinating requirements with roof membrane system.
2. Wind-Restraint Details: Detail fabrication and attachment of wind restraints. Show anchorage details and indicate quantity, diameter, and depth of penetration of anchors.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:

1. Size and location of roof accessories specified in this Section.
2. Method of attaching roof accessories to roof or building structure.
3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.
4. Required clearances.

B. Sample Warranties: For manufacturer's special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

1.7 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: [**20**] [**10**] <**Insert number**> years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design [**roof curbs**] [**and**] [**equipment supports**] to comply with wind performance requirements, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Wind-Restraint Performance: [**As indicated on Drawings**] <**Insert requirements**>.

2.2 EQUIPMENT SUPPORTS

A. Equipment Supports: [**Internally reinforced perimeter**] [**Rail-type**] metal equipment supports capable of supporting superimposed live and dead loads between structural supports, including equipment loads and other construction indicated on Drawings, spanning between structural supports; capable of meeting performance requirements; with welded[**or mechanically fastened and sealed**] corner joints,[**integral metal cant,**] [**stepped integral metal cant raised the thickness of roof insulation,**] and integrally formed structure-mounting flange at bottom.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

C. Supported Load Capacity: [**Coordinate load capacity with information on Shop Drawings of equipment to be supported**] <**Insert load requirements**>.

D. Material: [**Zinc-coated (galvanized)**] [**Aluminum-zinc alloy-coated**] steel sheet, [**0.052 inch (1.32 mm)**] [**0.064 inch (1.63 mm)**] [**0.079 inch (2.01 mm)**] <**Insert dimension**> thick.

1. Finish: [**Mill phosphatized**] [**Factory prime coating**] [**Two-coat fluoropolymer**] [**Baked enamel or powder coat**] <**Insert finish**>.
2. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] <**Insert color**>.

E. Material: Aluminum sheet, [**0.090 inch (2.28 mm)**] [**0.125 inch (3.17 mm)**] <**Insert dimension**> thick.

1. Finish: [**Mill**] [**Factory prime coating**] [**Clear anodic**] [**Color anodic**] [**Two-coat fluoropolymer**] [**Baked enamel or powder coat**] <**Insert finish**>.
2. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] [**Light bronze**] [**Medium bronze**] [**Dark bronze**] <**Insert color**>.

F. Material: Stainless steel sheet, [**0.0781 inch (1.983 mm)**] <**Insert dimension**> thick.

1. Finish: [**Manufacturer's standard**] [**ASTM A480/A480M, No. 2D, directional polish finish**] <**Insert finish**>.

G. Construction:

1. Curb Profile: [**Manufacturer's standard**] [**Profile as indicated on Drawings**] compatible with roofing system.
2. Insulation: Factory insulated with [**1-1/2-inch- (38-mm-)**] <**Insert dimension**> thick glass-fiber board insulation.
3. Liner: Same material as equipment support, of manufacturer's standard thickness and finish.
4. Nailer: Factory-installed continuous wood nailers [**3-1/2 inches (90 mm)**] [**5-1/2 inches (140 mm)**] <**Insert dimension**> wide [**on top flange of equipment supports**] [**under top flange on side of curb**], continuous around support perimeter.
5. Wind Restraint Straps and Base Flange Attachment: Provide wind restraint straps, welded strap connectors, and base flange attachment to roof structure at perimeter of curb of size and spacing required to meet wind uplift requirements.
6. Platform Cap: Where portion of equipment support is not covered by equipment, provide weathertight platform cap formed from 3/4-inch- (19-mm-) thick plywood covered with metal sheet of same type, thickness, and finish as required for curb.
7. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as equipment support.
8. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
9. Fabricate equipment supports to minimum height of [**12 inches (305 mm)**] <**Insert dimension**> above roofing surface unless otherwise indicated.

10. Sloping Roofs: Where roof slope exceeds 1:48, fabricate each support with height to accommodate roof slope so that tops of supports are level with each other. Equip supports with water diverters or crickets on sides that obstruct water flow.
11. Security Grille: [**Provide for all units**] [**Provide where indicated on Drawings**].

2.3 ROOF HATCHES

A. Roof Hatches: Metal roof-hatch units with lids and insulated single-walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing and weathertight perimeter gasketing, straight sides, and integrally formed deck-mounting flange at perimeter bottom.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Babcock-Davis.
    b. BILCO Company (The).
    c. Nystrom.
    d. O'Keeffe's Inc.

B. Type and Size: Single-leaf lid, 30 by 36 inches (750 by 900 mm).

C. Loads: Minimum 40-lbf/sq. ft. (1.9-kPa) external live load and 20-lbf/sq. ft. (0.95-kPa) internal uplift load.

D. Hatch Material: Aluminum sheet.

1. Thickness: Manufacturer's standard thickness for hatch size indicated.
2. Finish: Mill.

E. Construction:

1. Insulation: 1-inch- (25-mm-) thick, glass-fiber board.

    a. R-Value: 4.3 according to ASTM C1363.
2. Hatch Lid: Opaque, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.
3. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
4. Fabricate curbs to minimum height of 12 inches (305 mm) above roofing surface unless otherwise indicated.
5. Sloping Roofs: Where slope or roof deck exceeds 1:48, fabricate curb with perimeter curb height that is constant. Equip hatch with water diverter or cricket on side that obstructs water flow.

F. Hardware: Spring operators, hold-open arm, galvanized steel spring latch with turn handles, galvanized steel butt- or pintle-type hinge system, and padlock hasps inside and outside.

G. Safety Railing System: Roof-hatch manufacturer's standard system including rails, clamps, fasteners, safety barrier at railing opening, and accessories required for a complete installation;

attached to roof hatch and complying with 29 CFR 1910.23 requirements and authorities having jurisdiction.

1. Height: 42 inches (1060 mm) above finished roof deck.
2. Posts and Rails: Galvanized-steel pipe, 1-1/4 inches (31 mm) in diameter or galvanized-steel tube, 1-5/8 inches (41 mm) in diameter.
3. Flat Bar: Galvanized steel, 2 inches (50 mm) high by 3/8 inch (9 mm) thick.
4. Maximum Opening Size: System constructed to prevent passage of a sphere 21 inches (533 mm) in diameter.
5. Self-Latching Gate: Fabricated of same materials and rail spacing as safety railing system. Provide manufacturer's standard hinges and self-latching mechanism.
6. Post and Rail Tops and Ends: Weather resistant, closed or plugged with prefabricated end fittings.
7. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members.
8. Fabricate joints exposed to weather to be watertight.
9. Fasteners: Manufacturer's standard, finished to match railing system.
10. Finish: Manufacturer's standard.

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

H. Ladder-Assist Post: Roof-hatch manufacturer's standard device for attachment to roof-access ladder.

1. Operation: Post locks in place on full extension; release mechanism returns post to closed position.
2. Height: 42 inches (1060 mm) above finished roof deck.
3. Material: Steel tube or Aluminum.
4. Post: 1-5/8-inch- (41-mm-) diameter pipe.
5. Finish: Manufacturer's standard baked enamel or powder coat.

    a. Color: As indicated by manufacturer's designations.

2.4 PIPE PORTALS

A. Curb-Mounted Pipe Portal: Insulated roof-curb units with welded or mechanically fastened and sealed corner joints,[**straight sides,**] [**integral metal cant,**] [**stepped integral metal cant raised the thickness of roof insulation,**] and integrally formed deck-mounting flange at perimeter bottom; with weathertight curb cover with single or multiple collared openings and pressure-sealed conically shaped EPDM protective rubber caps sized for piping indicated, with stainless steel snaplock swivel clamps.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

B. Flashing Pipe Portal: Formed aluminum membrane-mounting flashing flange and sleeve with collared opening and pressure-sealed conically shaped EPDM protective rubber cap sized for piping indicated, with stainless steel snaplock swivel clamps.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

2.5 METAL MATERIALS

A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, G90 (Z275) coating designation[**and mill phosphatized for field painting where indicated**].

1. Mill-Phosphatized Finish: Manufacturer's standard for field painting.
2. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil (0.005 mm).
3. Exposed Coil-Coated Finish: Prepainted by the coil-coating process to comply with ASTM A755/A755M. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

    a. Two-Coat Fluoropolymer Finish: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight.

4. Baked-Enamel or 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 (0.05 mm).
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 (0.013 mm).

B. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A792/A792M, AZ50 (AZM150) coated.

1. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil (0.005 mm).
2. Exposed Coil-Coated Finish: Prepainted by the coil-coating process to comply with ASTM A755/A755M. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

    a. Two-Coat Fluoropolymer Finish: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight.

3. Baked-Enamel or 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 (0.05 mm).
4. 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 (0.013 mm).

C. Aluminum Sheet: ASTM B209 (ASTM B209M), manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.

1. Mill Finish: As manufactured.
2. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil (0.005 mm).

3. Clear Anodic Finish: AAMA 611, [**AA-M12C22A41, Class I, 0.018 mm**] [**AA-M12C22A31, Class II, 0.010 mm**] or thicker.
4. Color Anodic Finish: AAMA 611, [**AA-M12C22A42/A44, Class I, 0.018 mm**] [**AA-M12C22A32/A34, Class II, 0.010 mm**] or thicker.
5. Exposed Coil-Coated Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

    a. Two-Coat Fluoropolymer Finish: AAMA 2605. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight.

6. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
7. 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 (0.013 mm).

D. Aluminum Extrusions and Tubes: ASTM B221 (ASTM B221M), manufacturer's standard alloy and temper for type of use, finished to match assembly where used; otherwise mill finished.

E. Stainless Steel Sheet and Shapes: ASTM A240/A240M or ASTM A666, Type 304.

F. Steel Shapes: ASTM A36/A36M, hot-dip galvanized according to ASTM A123/A123M unless otherwise indicated.

G. Steel Tube: ASTM A500/A500M, round tube.

H. Galvanized-Steel Tube: ASTM A500/A500M, round tube, hot-dip galvanized according to ASTM A123/A123M.

I. Steel Pipe: ASTM A53/A53M, galvanized.

2.6 MISCELLANEOUS MATERIALS

A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Acrylic Glazing: ASTM D4802, thermoformable, monolithic sheet, manufacturer's standard, Type UVA (formulated with UV absorber), Finish 1 (smooth or polished).

C. Polycarbonate Glazing: Thermoformable, monolithic polycarbonate sheets manufactured by extrusion process, burglar-resistance rated according to UL 972 with an average impact strength of [**12 to 16 ft-lbf/in. (640 to 854 J/m)**] <**Insert value**> of width when tested according to ASTM D256, Method A (Izod).

D. Cellulosic-Fiber Board Insulation: ASTM C208, Type II, Grade 1, thickness as indicated.

E. Glass-Fiber Board Insulation: ASTM C726, nominal density of 3 lb/cu. ft. (48 kg/cu. m), thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C), thickness as indicated.

F. Polyisocyanurate Board Insulation: ASTM C1289, thickness and thermal resistivity as indicated.

G. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction,[**containing no arsenic or chromium,**] and complying with AWPA C2; not less than 1-1/2 inches (38 mm) thick.

H. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

I. Underlayment:

1. Felt: ASTM D226/D226M, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
2. Polyethylene Sheet: 6-mil- (0.15-mm-) thick polyethylene sheet complying with ASTM D4397.
3. Slip Sheet: Building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m) minimum, rosin sized.
4. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils (0.76 to 1.0 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

J. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:

1. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A153/A153M or ASTM F2329.
2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.

K. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.

L. Elastomeric Sealant: ASTM C920, elastomeric [**polyurethane**] [**silicone**] polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.

M. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.

N. Asphalt Roofing Cement: ASTM D4586/D4586M, asbestos free, of consistency required for application.

2.7 GENERAL FINISH REQUIREMENTS

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

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

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.

B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

C. Verify dimensions of roof openings for roof accessories.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install roof accessories according to manufacturer's written instructions.

1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of [**uncoated aluminum**] [**stainless steel**] roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of underlayment and cover with manufacturer's recommended slip sheet.
3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.

C. Roof Curb Installation: Install each roof curb so top surface is level.

D. Equipment Support Installation: Install equipment supports so top surfaces are level with each other.

E. Roof-Hatch Installation:

1. Verify that roof hatch operates properly. Clean, lubricate, and adjust operating mechanism and hardware.
2. Attach safety railing system to roof-hatch curb.
3. Attach ladder-assist post according to manufacturer's written instructions.

F. Heat and Smoke Vent Installation:

1. Install heat and smoke vent so top perimeter surfaces are level.
2. Install and test heat and smoke vents and their components for proper operation according to NFPA 204.

G. Gravity Ventilator Installation: Verify that gravity ventilators operate properly and have unrestricted airflow. Clean, lubricate, and adjust operating mechanisms.

H. Pipe Support Installation: Comply with MSS SP-58 and MSS SP-89. Install supports and attachments as required to properly support piping. Arrange for grouping of parallel runs of horizontal piping, and support together.

1. Pipes of Various Sizes: Space supports for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.

I. Preformed Flashing-Sleeve[**and Flashing Pipe Portal**] Installation: Secure flashing sleeve to roof membrane according to flashing-sleeve manufacturer's written instructions; flash sleeve flange to surrounding roof membrane according to roof membrane manufacturer's instructions.

J. Security Grilles: Weld bar intersections and[**, using tamper-resistant bolts, attach the**] ends of bars to structural frame or primary curb walls.

K. Roof Walkway Installation:

1. Verify that locations of access and servicing points for roof-mounted equipment are served by locations of roof walkways.
2. Remove ballast from top surface of low-slope roofing at locations of contact with roof-walkway supports.
3. Install roof walkway support pads prior to placement of roof walkway support stands onto low-slope roofing.
4. Redistribute removed ballast after installation of support pads.

L. Seal joints with [**elastomeric**] [**or**] [**butyl**] sealant as required by roof accessory manufacturer.

3.3 REPAIR AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A780/A780M.

B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 099113 "Exterior Painting."

C. Clean exposed surfaces according to manufacturer's written instructions.

D. Clean off excess sealants.

E. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077200

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Penetrations in fire-resistance-rated walls.
2. Penetrations in horizontal assemblies.
3. Penetrations in smoke barriers.

B. Related Requirements:

1. Section 078443 "Joint Firestopping" 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.

B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

C. Coordinated Submission: Provide submittals for all trades at the same time if they are being performed individually by each trade.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.4 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.5 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 its "Qualified Firestop Contractor Program Requirements."

B. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, through one source from a single manufacturer. Exceptions will be considered for any specialty conditions or assemblies.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:

a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.

1) UL in its "Fire Resistance Directory."

2.2 PENETRATION FIRESTOPPING SYSTEMS

A. Penetration Firestopping Systems: Systems that resist spread of fire, 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.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. 3M Fire Protection Products.
    b. Hilti, Inc.
    c. Specified Technologies, Inc.
    d. Tremco, Inc.

B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).

1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).

1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
3. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.

D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg (74.7 Pa).

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. (0.025 cu. m/s per sq. m) of penetration opening at and no more than 50-cfm (0.024-cu. m/s) cumulative total for any 100 sq. ft. (9.3 sq. m) at both ambient and elevated temperatures.

E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E 84.

F. VOC Content: Penetration firestopping sealants and sealant primers shall comply with the following limits for VOC content:

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

G. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.

1. Permanent forming/damming/backing materials.
2. Substrate primers.
3. Collars.
4. Steel sleeves.

2.3 FILL MATERIALS

A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer sleeve lined with an intumescent strip, a flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.

E. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.

F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

G. 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.

H. 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.

I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

2.4 MIXING

A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. 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: Before installing penetration firestopping systems, clean out openings immediately 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 materials.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. 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.

3.3 INSTALLATION

A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.

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.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.

C. Install fill materials by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
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. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches (76 mm) high and with minimum 0.375-inch (9.5-mm) strokes.

1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet (4.57 m) from end of wall and at intervals not exceeding 30 feet (9.14 m).

3.5 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2174.

B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.

C. Proceed with enclosing penetration firestopping systems 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 system 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 systems are 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 material 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.

B. Penetration Firestopping Systems with No Penetrating Items:

1. UL-Classified Systems: C-AJ- C-BJ- W-J- W-L- 0001-0999.
2. Type of Fill Materials: As required to achieve rating.

C. Penetration Firestopping Systems for Metallic Pipes, Conduit, or Tubing:

1. UL-Classified Systems: C-AJ- C-BJ- C-BK- F-B- W-J- W-K- W-L- 1001-1999.
2. Type of Fill Materials: As required to achieve rating.

D. Penetration Firestopping Systems for Nonmetallic Pipe, Conduit, or Tubing:

1. UL-Classified Systems: C-AJ- C-BJ- C-BK- F-B- F-C- W-J- W-K- W-L- 2001-2999.
2. Type of Fill Materials: As required to achieve rating.

E. Penetration Firestopping Systems for Electrical Cables:

1. UL-Classified Systems: C-AJ- C-BJ- C-BK- F-B- F-C- W-J- W-K- W-L- 3001-3999.
2. Type of Fill Materials: As required to achieve rating.

F. Penetration Firestopping Systems for Cable Trays with Electric Cables:

1. UL-Classified Systems: C-AJ- C-BJ- F-B- F-C- W-J- W-K- W-L- 4001-4999.
2. Type of Fill Materials: As required to achieve rating.

G. Penetration Firestopping Systems for Insulated Pipes:

1. UL-Classified Systems: C-AJ- C-BJ- C-BK- F-A- F-B- F-C- W-J- W-L- 5001-5999.
2. Type of Fill Materials: As required to achieve rating.

H. Penetration Firestopping Systems for Miscellaneous Electrical Penetrants:

1. UL-Classified Systems: C-AJ- C-BJ- F-A- W-L- W-J- 6001-6999.
2. Type of Fill Materials: As required to achieve rating.

I. Penetration Firestopping Systems for Miscellaneous Mechanical Penetrants:

1. UL-Classified Systems: C-AJ- C-BJ- F-A- F-B- F-C- W-J- W-L- 7001-7999.
2. Type of Fill Materials: As required to achieve rating.

J. Penetration Firestopping Systems for Groupings of Penetrants:

1. UL-Classified Systems: C-AJ- C-BJ- F-A- F-B- F-C- W-J- W-L- 8001-8999.
2. Type of Fill Materials: As required to achieve rating.

END OF SECTION 078413

SECTION 078443 - JOINT FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Joints in or between fire-resistance-rated constructions.
2. Joints in smoke barriers.

B. Related Requirements:

1. Section 078413 "Penetration Firestopping" for penetrations in fire-resistance-rated walls, horizontal assemblies, and smoke barriers and for wall identification.
2. Section 079500 "Expansion Control" for fire-resistive architectural joint systems.
3. Section 092216 "Non-Structural Metal Framing" for firestop tracks for metal-framed partition heads.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.

C. Coordinated Submission: Provide submittals for all trades at the same time if they are being performed individually by each trade.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each joint firestopping system, for tests performed by a qualified testing agency.

1.4 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.5 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."

B. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, through one source from a single manufacturer. Exceptions will be considered for any specialty conditions or assemblies.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install joint firestopping systems when ambient or substrate temperatures are outside limits permitted by joint firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Install and cure joint firestopping systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

A. Coordinate construction of joints to ensure that joint firestopping systems can be installed according to specified firestopping system design.

B. Coordinate sizing of joints to accommodate joint firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:

a. Joint firestopping systems shall bear classification marking of a qualified testing agency.

1) UL in its "Fire Resistance Directory."

2.2 JOINT FIRESTOPPING SYSTEMS

A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping

systems are installed. Joint firestopping 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 joint firestopping systems with ratings determined per ASTM E 1966 or UL 2079.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M Fire Protection Products.
b. Hilti, Inc.
c. Specified Technologies, Inc.
d. Tremco, Inc.

2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.

C. Joints in Smoke Barriers: Provide fire-resistive joint systems with ratings determined per UL 2079 based on testing at a positive pressure differential of 0.30-inch wg (74.7 Pa).

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M Fire Protection Products.
b. Hilti, Inc.
c. Specified Technologies, Inc.
d. Tremco, Inc.

2. L-Rating: Not exceeding 5.0 cfm/ft. (0.00775 cu. m/s x m) of joint at both ambient and elevated temperatures.

D. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

E. VOC Content: Fire-resistive joint system sealants shall comply with the following limits for VOC content:

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

F. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

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: Before installing fire-resistive joint systems, clean joints immediately 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 elastomeric fill materials or compromise fire-resistive rating.
2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with elastomeric fill materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Prime substrates where recommended in writing by joint firestopping 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.

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 elastomeric 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 elastomeric 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 elastomeric fill materials for fire-resistive joint systems by proven techniques to produce the following results:

1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2393.

B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.

C. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.5 CLEANING AND PROTECTION

A. Clean off excess elastomeric fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by joint firestopping 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 joint firestopping 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.

3.6 JOINT FIRESTOPPING 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. Floor-to-Floor, Joint Firestopping Systems:

1. UL-Classified Systems: FF-D- 0000-0999 1000-1999.
2. Assembly Rating: Equal to the highest assembly rating being joined.
3. Nominal Joint Width: As indicated.
4. Movement Capabilities: Class I - 100 percent compression or extension.
5. L-Rating at Ambient: Less than 5 cfm/ft. (cu. m/s x m).
6. L-Rating at 400 Deg F (204 Deg C): Less than 5 cfm/ft. (cu. m/s x m).
7. W-Rating: No leakage of water at completion of water leakage testing.

C. Wall-to-Wall, Joint Firestopping Systems:

1. UL-Classified Systems: WW-D- 0000-0999 1000-1999.
2. Assembly Rating: Equal to the highest assembly rating being joined.
3. Nominal Joint Width: As indicated.
4. Movement Capabilities: Class I at interior and Class II at exterior - 100 percent compression or extension.
5. L-Rating at Ambient: Less than 5 cfm/ft. (cu. m/s x m).
6. L-Rating at 400 Deg F (204 Deg C): Less than 5 cfm/ft. (cu. m/s x m).

D. Floor-to-Wall, Joint Firestopping Systems:

1. UL-Classified Systems: FW-D- 0000-0999 1000-1999.
2. Assembly Rating: Equal to the highest assembly rating being joined.
3. Nominal Joint Width: As indicated.
4. Movement Capabilities: Class I at interior and Class II at exterior - 100 percent compression, extension, or horizontal shear.
5. L-Rating at Ambient: Less than 5 cfm/ft. (cu. m/s x m).
6. L-Rating at 400 Deg F (204 Deg C): Less than 5 cfm/ft. (cu. m/s x m).

E. Head-of-Wall, Fire-Resistive Joint Firestopping Systems:

1. UL-Classified Systems: HW-D- 0000-0999 1000-1999.
2. Assembly Rating: Equal to the highest assembly rating being joined.
3. Nominal Joint Width: As indicated.
4. Movement Capabilities: Class I at interior and Class II at exterior - 100 percent compression or extension.
5. L-Rating at Ambient: Less than 5 cfm/ft. (cu. m/s x m).
6. L-Rating at 400 Deg F (204 Deg C): Less than 5 cfm/ft. (cu. m/s x m).

F. Bottom-of-Wall, Joint Firestopping Systems:

1. UL-Classified Systems: BW-D- 0000-0999 1000-1999.
2. Assembly Rating: Equal to the highest assembly rating being joined.
3. Nominal Joint Width: As indicated.
4. Movement Capabilities: Class I at interior and Class II at exterior - 100 percent compression or extension.
5. L-Rating at Ambient: Less than 5 cfm/ft. (cu. m/s x m).
6. L-Rating at 400 Deg F (204 Deg C): Less than 5 cfm/ft. (cu. m/s x m).

G. Wall-to-Wall, Joint Firestopping Systems Intended for Use as Corner Guards:

1. UL-Classified Systems: CG-D- 0000-0999 1000-1999.
2. Assembly Rating: Equal to the highest assembly rating being joined.
3. Nominal Joint Width: As indicated.
4. Movement Capabilities: Class I - 100 percent compression or extension.
5. L-Rating at Ambient: Less than 5 cfm/ft. (cu. m/s x m).
6. L-Rating at 400 Deg F (204 Deg C): Less than 5 cfm/ft. (cu. m/s x m).

H. Perimeter Joint Firestopping Systems:

1. UL-Classified Perimeter Fire-Containment Systems: CW-D- 0000-0999 1000-1999.
2. Integrity Rating: Equal to the highest assembly rating being joined.
3. Insulation Rating: 1 hour.
4. Linear Opening Width: As indicated, maximum.
5. Movement Capabilities: Class II - 100 percent compression or extension.
6. F-Rating: Equal to the highest assembly rating being joined..

END OF SECTION 078443

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Nonstaining silicone joint sealants.
2. Silyl-terminated polyether (STPE) joint sealants.
3. Mildew-resistant joint sealants.
4. Butyl joint sealants.
5. Latex joint sealants.

B. Related Requirements:

1. Section 079100 "Preformed Joint Seals" for preformed compressible foam and precured joint seals.
2. Section 079219 "Acoustical Joint Sealants" for sealing joints in sound-rated construction.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 PRODUCT SUPPLY & SUPPORT

A. Primary supply & support contact: Rob Flynn, Coastal Construction Products, Inc., 3401 Philips Hwy., Jacksonville, Florida 32207, PH: (904) 398-7171

1.4 ACTION SUBMITTALS

A. Product Data:

1. Joint-sealants.
2. Joint sealant backing materials.

B. Samples for Initial Selection: Manufacturer's standard color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. 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.

1.5 INFORMATIONAL SUBMITTALS

A. Test and Evaluation Reports:

1. Preconstruction Laboratory Test Schedule: Include the following information for each joint sealant and substrate material to be tested:

   a. Joint-sealant location and designation.
   b. Manufacturer and product name.
   c. Type of substrate material.
   d. Proposed test.
   e. Number of samples required.

2. Preconstruction Laboratory Test Reports: For each joint sealant and substrate material to be tested from sealant manufacturer, indicating the following:

   a. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
   b. Interpretation of test results and written recommendations for primers and substrate preparation are needed for adhesion.

3. 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.

B. Field Quality-Control Submittals:

1. Field-Adhesion-Test Reports: For each sealant application tested.

C. Sample warranties.

1.6 CLOSEOUT SUBMITTALS

A. Warranty Documentation:

1. Manufacturers' special warranties.
2. Installer's special warranties.

1.7 QUALITY ASSURANCE

A. Qualifications:

1. Installers: Authorized representative who is trained and approved by manufacturer.
2. Testing Agency: Qualified in accordance with ASTM C1021 to conduct the testing indicated.

1.8 MOCKUPS

A. 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.

1.9 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 kind of sealant and joint substrate.
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 in accordance with Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.

        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.

1.10 FIELD 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 (5 deg C).
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.

1.11 WARRANTY

A. Special Installer's Warranty: 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: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period Silicone: 20 years from date of Substantial Completion.

2. Warranty Period STPE: 10 years from date of Substantial Completion.

3. Warranty Period Mildew Resistant: 5 years from date of Substantial Completion.

4. Warranty Period Acrylic Latex: 5 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 stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from 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 SOURCE LIMITATIONS

A. Obtain joint sealants from single manufacturer for each sealant type.

2.2 JOINT SEALANTS, 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. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 NONSTAINING SILICONE JOINT SEALANTS

A. Nonstaining Joint Sealants: No staining of substrates when tested in accordance with ASTM C1248.

B. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 50, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. GE Construction Sealants; Momentive Performance Materials Inc.
b. The Dow Chemical Company. (Dowsil 795)
c. Tremco Incorporated.

C. Silicone, Nonstaining, S, NS, 100/50, T, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Uses T and NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. The Dow Chemical Company. (Dowsil NS Parking Structure Sealant @ sidewalks) (Dowsil 790 @ concealed masonry joints)
b. Tremco Incorporated.

2.4 SILYL-TERMINATED POLYETHER (STPE) JOINT SEALANTS

A. STPE, S, NS, NT: Single-component, nonsag, nontraffic-use, silyl-terminated polyether joint sealant; Type S, Grade NS, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. GE Construction Sealants; Momentive Performance Materials Inc.
b. Grace.
c. Henry.
d. Prosoco.
e. Sika Corporation.
f. The Dow Chemical Company. (Dowsil CPS)

2.5 MILDEW-RESISTANT JOINT SEALANTS

A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. GE Construction Sealants; Momentive Performance Materials Inc.

b. The Dow Chemical Company.
c. Tremco Incorporated.

2.6 BUTYL JOINT SEALANTS

A. Butyl-Rubber-Based Joint Sealants: ASTM C1311.

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. Bostik; Arkema.
b. Pecora Corporation.

2.7 LATEX JOINT SEALANTS

A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Sherwin-Williams Company (The).
b. Tremco Incorporated.

2.8 JOINT-SEALANT BACKING

A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

1. 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. Construction Foam Products; a division of Nomaco, Inc.
b. Master Builders Solutions.

B. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin) Type O (open-cell material) Type B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.9 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: Nonstaining, 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 performance of the Work.

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.
    c. Unglazed surfaces of ceramic tile.
    d. Exterior insulation and finish systems.
    e. Cement Plaster.

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.
    c. Porcelain enamel.
    d. Glazed surfaces of ceramic tile.
    e. Laminate.
    f. Quartz.
    g. Solid Surface.

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 C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. 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.

F. Tooling of Nonsag 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 in accordance with Figure 8A in ASTM C1193 unless otherwise indicated.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Tests and Inspections:

1. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

a. Extent of Testing: Test completed and cured sealant joints as follows:

1) Perform 10 tests for the first 1000 ft. (300 m) of joint length for each kind of sealant and joint substrate.
2) Perform one test for each 1000 ft. (300 m) of joint length thereafter or one test per each floor per elevation.

b. Test Method: Test joint sealants in accordance with Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.

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.

c. Inspect tested joints and report on the following:

1) Whether sealants filled joint cavities and are free of voids.
2) Whether sealant dimensions and configurations comply with specified requirements.
3) 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.

d. 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.

e. 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.

2. 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.

C. Prepare test and inspection reports.

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, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT-SEALANT SCHEDULE

A. Exterior joints in horizontal traffic surfaces JS-#01:

1. Joint Locations:

a. Control and expansion joints in brick pavers.
b. Isolation and contraction joints in cast-in-place concrete slabs.
c. Joints between plant-precast architectural concrete paving units.
d. Joints in stone paving units, including steps.
e. Tile control and expansion joints.
f. Joints between different materials listed above.
g. Joint between building foundation and concrete sidewalk/patio.
h. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, nonstaining, S, NS, 100/50, T, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Exterior joints in vertical surfaces and horizontal nontraffic surfaces JS-#02:

1. Joint Locations:

a. Construction joints in cast-in-place concrete.

b. Joints between plant-precast architectural concrete units.
c. Control and expansion joints in unit masonry.
d. Joints in dimension stone cladding.
e. Joints in glass unit masonry assemblies.
f. Joints in exterior insulation and finish systems.
g. Joints between metal panels.
h. Joints between different materials listed above.
i. Perimeter joints between materials listed above and frames of doors windows and louvers.
j. Control and expansion joints in ceilings and other overhead surfaces.
k. Expansion joints in cement plaster.
l. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

C. Interior joints in horizontal traffic surfaces JS-#03:

1. Joint Locations:

a. Isolation joints in cast-in-place concrete slabs.
b. Control and expansion joints in stone flooring.
c. Control and expansion joints in brick flooring.
d. Control and expansion joints in tile flooring.
e. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

D. Interior joints in vertical surfaces and horizontal nontraffic surfaces JS-#04:

1. Joint Locations:

a. Control and expansion joints on exposed interior surfaces of exterior walls.
b. Tile control and expansion joints.
c. Vertical joints on exposed surfaces of unit masonry concrete walls and partitions.
d. Joints on underside of plant-precast structural concrete beams and planks.
e. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

E. Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement JS-#05:

1. Joint Locations:

a. Control joints on exposed interior surfaces of exterior walls.
b. Perimeter joints between interior wall surfaces and frames of interior doors windows, PTAC sleeves and elevator entrances.
c. Cabinets and countertops to interior wall surfaces.

d. Other joints as indicated on Drawings.

2. Joint Sealant: Acrylic latex.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

F. Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces JS-#06:

1. Joint Locations:

a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
b. Tile control and expansion joints where indicated.
c. Countertop joints.
d. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

G. Concealed mastics JS-#07:

1. Joint Locations:

a. Aluminum thresholds.
b. Sill plates.
c. Other joints as indicated on Drawings.

2. Joint Sealant: Butyl-rubber based.
3. Joint-Sealant Color: As indicated by manufacturer's designations.

END OF SECTION 079200

SECTION 079513.13 - INTERIOR EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes interior expansion joint cover assemblies.

1.3 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 joint cover assembly.

1. Include plans, elevations, sections, details, splices, block-out requirement, attachments to other work, and line diagrams showing entire route of each expansion joint.
2. Where expansion joint cover assemblies change planes, provide isometric or clearly detailed drawing depicting how components interconnect.

C. 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.

D. Samples for Verification: For each type of expansion joint cover assembly, full width by 6 inches (150 mm) long in size.

E. Expansion Joint Cover Assembly 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 joint cover assembly.
2. Expansion joint cover assembly location cross-referenced to Drawings.
3. Nominal, minimum, and maximum joint width.
4. Movement direction.
5. Materials, colors, and finishes.
6. Product options.
7. Fire-resistance ratings.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each fire-resistance-rated expansion joint cover assembly, for tests performed by a qualified testing agency.

1.5 QUALITY ASSURANCE

A. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Build mockup of typical expansion joint cover assembly 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.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

A. Furnish units in longest practicable lengths to minimize field splicing.

B. Include factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous expansion joint cover assemblies.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Expansion joint cover assemblies shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

B. Fire-Resistance Ratings: Provide expansion joint cover assemblies with fire barriers identical to those of systems tested for fire resistance according to UL 2079 or ASTM E1966 by a qualified testing agency.

1. Hose Stream Test: Wall-to-wall and wall-to-ceiling assemblies shall be subjected to hose stream testing.

C. Expansion Joint Design Criteria:

1. Type of Movement: Thermal.

a. Nominal Joint Width: As indicated on Drawings.

2. Type of Movement: Seismic.

a. Joint Movement: As indicated on Drawings.

2.3 FLOOR EXPANSION JOINT COVERS

A. Center-Plate Floor Joint Cover FEJ-1: Assembly consisting of center plate that slides over metal frames fixed to sides of joint gaps.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Balco; a CSW Industrials Company.
b. Construction Specialties, Inc.
c. Inpro Corporation.
d. MM Systems Corporation.

2. Application: Floor to floor.
3. Installation: Recessed No bump.
4. Load Capacity:

a. Uniform Load: 50 lb/sq. ft. (244 kg/sq. m).
b. Concentrated Load: 300 lb (136 kg).
c. Maximum Deflection: 0.0625 inch (1.6 mm).

5. Fire-Resistance Rating: Not less than that of adjacent construction.
6. Cover-Plate Design: Plain.
7. Exposed Metal:

a. Aluminum: Clear anodic, Class I.

B. Glide-Plate Floor Joint Cover FEJ-2: Assembly consisting of center plate that slides in and out of slots in metal frames fixed to sides of joint gap.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Balco; a CSW Industrials Company.
b. Construction Specialties, Inc.
c. Inpro Corporation.
d. MM Systems Corporation.

2. Application: Floor to floor.
3. Installation: Recessed.
4. Load Capacity:

a. Uniform Load: 50 lb/sq. ft. (244 kg/sq. m).
b. Concentrated Load: 300 lb (136 kg).
c. Maximum Deflection: 0.0625 inch (1.6 mm).

5. Fire-Resistance Rating: Not less than that of adjacent construction.
6. Exposed Metal:

a. Aluminum: Clear anodic, Class I.

C. Hidden-Sightline Floor Joint Cover FEJ-3: Sliding leaf-spring and metal frame assembly designed to accept field-applied finish materials on visible surfaces for minimum frame exposure.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Balco; a CSW Industrials Company.
   b. Construction Specialties, Inc.
   c. Inpro Corporation.
   d. MM Systems Corporation.

2. Application: Floor to floor.
3. Installation: Recessed.
4. Load Capacity:

   a. Uniform Load: 50 lb/sq. ft. (244 kg/sq. m).
   b. Concentrated Load: 300 lb (136 kg).
   c. Maximum Deflection: 0.0625 inch (1.6 mm).

5. Fire-Resistance Rating: Not less than that of adjacent construction.

2.4 WALL EXPANSION JOINT COVERS

A. Elastomeric-Seal Wall Joint Cover WEJ-1: Assembly consisting of elastomeric seal anchored to frames fixed to sides of joint gap.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Balco; a CSW Industrials Company.
   b. Construction Specialties, Inc.
   c. Inpro Corporation.
   d. MM Systems Corporation.

2. Application: Wall to wall.
3. Fire-Resistance Rating: Not less than that of adjacent construction.
4. Exposed Metal:

   a. Aluminum: Color anodic, Class II.

      1) Color: As selected by Architect from full range of industry colors and color densities.

5. Seal: Preformed elastomeric membranes or extrusions.

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

2.5 CEILING EXPANSION JOINT COVERS

A. Elastomeric-Seal Ceiling Joint Cover CEJ-1: Assembly consisting of elastomeric seal anchored to frames fixed to sides of joint gap.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Balco; a CSW Industrials Company.
b. Construction Specialties, Inc.
c. Inpro Corporation.
d. MM Systems Corporation.

2. Application: Ceiling to ceiling.
3. Fire-Resistance Rating: Not less than that of adjacent construction.

a. Aluminum: Color anodic, Class II.

1) Color: As selected by Architect from full range of industry colors and color densities.

4. Seal: Preformed elastomeric membranes or extrusions.

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

B. Elastomeric-Seal Acoustical Ceiling Joint Cover CEJ-2: Elastomeric-seal assembly designed for use in acoustical ceilings.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Balco; a CSW Industrials Company.
b. Construction Specialties, Inc.
c. Inpro Corporation.
d. MM Systems Corporation.

2. Application: Ceiling to ceiling.
3. Fire-Resistance Rating: Not less than that of adjacent construction.
4. Exposed Metal:

a. Aluminum: Color anodic, Class II.

1) Color: As selected by Architect from full range of industry colors and color densities.

5. Seal: Preformed elastomeric membranes or extrusions.

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

2.6 MATERIALS

A. Aluminum: ASTM B221 (ASTM B221M), Alloy 6063-T5 for extrusions; ASTM B209 (ASTM B209M), 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. Fire Barriers: Any material or material combination, when fire tested after cycling, designated to resist the passage of flame and hot gases through a movement joint and to comply with performance criteria for required fire-resistance rating.

D. Moisture Barrier: Manufacturer's standard, flexible elastomeric material.

E. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.7 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm and AA-M12C22A31, Class II, 0.010 mm or thicker. Refer to locations noted above.

B. Color Anodic Finish: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.

2.8 ACCESSORIES

A. Moisture Barriers: Manufacturer's standard continuous, waterproof membrane within joint and attached to substrate on sides of joint.

1. Provide where indicated on Drawings.

B. Manufacturer's stainless-steel attachment devices. Include anchors, clips, fasteners, set screws, spacers, 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 joint cover assemblies will be installed for installation tolerances and other conditions affecting performance of the Work.

B. Notify Architect where discrepancies occur that will affect proper expansion joint cover assembly installation and performance.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 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 joint cover assemblies and materials unless more stringent requirements are indicated.

B. Metal Frames: Perform cutting, drilling, and fitting required to install expansion joint cover assemblies.

1. Repair or grout block out as required for continuous frame support using nonmetallic, shrinkage-resistant grout.
2. Install frames in continuous contact with adjacent surfaces.
    a. Shimming is not permitted.
3. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
4. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation.
5. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
6. Locate anchors at interval recommended by manufacturer, but not less than 3 inches (75 mm) from each end and not more than 24 inches (600 mm) 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. Terminate exposed ends of expansion joint cover assemblies with field- or factory-fabricated termination devices.

F. Fire-Resistance-Rated Assemblies: Coordinate installation of expansion joint cover assembly materials and associated work so complete assemblies comply with performance requirements.

1. Fire Barriers: Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of joint, including transitions and field splices.

G. Moisture Barrier Drainage: If indicated, provide drainage fittings and connect to drains.

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 joint cover assemblies. Reinstall cover plates or seals prior to Substantial Completion.

END OF SECTION 079513.13

SECTION 079513.16 - EXTERIOR EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior expansion joint covers.

B. Related Requirements:

1. Section 077129 "Manufactured Roof Expansion Joints" for factory-fabricated roof expansion joint cover assemblies.
2. Section 079100 "Preformed Joint Seals" for preformed foam and extruded-silicone joint seals.
3. Section 079513.19 "Parking Deck Expansion Joint Cover Assemblies" for expansion joint cover assemblies subject to vehicular traffic.

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 joint cover assembly.

1. Include plans, elevations, sections, details, splices, block-out requirement, attachments to other work, and line diagrams showing entire route of each expansion joint.
2. Where expansion joint cover assemblies change planes, provide isometric or clearly detailed drawing depicting how components interconnect.

C. 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.

D. Samples for Verification: For each type of expansion joint cover assembly, full width by 6 inches (150 mm) long in size.

E. Expansion Joint Cover Assembly 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 joint cover assembly.
2. Expansion joint cover assembly location cross-referenced to Drawings.
3. Nominal, minimum, and maximum joint width.
4. Movement direction.

5. Materials, colors, and finishes.
6. Product options.
7. Fire-resistance ratings.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each fire-resistance-rated expansion joint cover assembly, for tests performed by a qualified testing agency.

1.4 MOCKUPS

A. Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Build mockup of typical expansion joint cover assembly 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.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

A. Furnish units in longest practicable lengths to minimize field splicing.

B. Include factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous expansion joint cover assemblies.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Expansion joint cover assemblies shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

B. Fire-Resistance Ratings: Provide expansion joint cover assemblies with fire barriers identical to those of systems tested for fire resistance according to UL 2079 or ASTM E1966 by a qualified testing agency.

1. Hose Stream Test: Wall-to-wall and wall-to-soffit assemblies shall be subjected to hose stream testing.

C. Expansion Joint Design Criteria:

1. Type of Movement: Thermal.

a. Nominal Joint Width: As indicated on Drawings.

2. Seismic Movement:

a. Joint Movement: As indicated on Drawings.

2.3 EXTERIOR EXPANSION JOINT COVERS

A. Exterior Metal-Plate Joint Cover EEJ-1: Assembly consisting of sliding metal cover plate in continuous contact with gaskets mounted on metal frames fixed to sides of joint gap.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Balco; a CSW Industrials Company.
b. Construction Specialties, Inc.
c. Inpro Corporation.
d. MM Systems Corporation.

2. Application: Wall to wall or Soffit to soffit.
3. Installation: Surface mounted.
4. Fire-Resistance Rating: Not less than that of adjacent construction.
5. Exposed Metal:

a. Aluminum: Color anodic, Class I.

1) Color: As selected by Architect from full range of industry colors and color densities.

B. Exterior Elastomeric-Seal Joint Cover EEJ-2: Assembly consisting of elastomeric seal anchored to surface-mounted frames fixed to sides of joint gap.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Balco; a CSW Industrials Company.
b. Construction Specialties, Inc.
c. Inpro Corporation.
d. MM Systems Corporation.

2. Application: Wall to wall or Soffit to soffit.
3. Installation: Recessed.
4. Fire-Resistance Rating: Not less than that of adjacent construction.
5. Exposed Metal:

a. Aluminum: Color anodic, Class I.

1) Color: As selected by Architect from full range of industry colors and color densities.

6. Seal: Preformed elastomeric membrane or extrusion.

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

C. Preformed Foam Joint Seals EEJ-3: Manufacturer's standard joint seal manufactured from urethane or EVA (ethylene vinyl acetate) foam with minimum density of 10 lb/cu. ft. (160 kg/cu. m) and impregnated with a nondrying, water-repellent agent. Factory produce in precompressed sizes in roll or stick form to fit joint widths based on design criteria indicated, with factory- or field-applied adhesive for bonding to substrates.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Balco; a CSW Industrials Company.
b. MM Systems Corporation.

2. Design Criteria:

a. Nominal Joint Width: As indicated on Drawings.
b. Movement Capability: -25 percent/+25 percent.

3. Joint Seal Color: As selected by Architect from full range of industry colors.

2.4 MATERIALS

A. Aluminum: ASTM B221 (ASTM B221M), Alloy 6063-T5 for extrusions; ASTM B209 (ASTM B209M), 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. Fire Barriers: Any material or material combination, when fire tested after cycling, designated to resist the passage of flame and hot gases through a movement joint and to comply with performance criteria for required fire-resistance rating.

D. Moisture Barrier: Manufacturer's standard, flexible elastomeric material.

2.5 ALUMINUM FINISHES

A. Mill finish.

B. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

C. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.

2.6 ACCESSORIES

A. Moisture Barriers: Manufacturer's standard continuous, waterproof membrane within joint and attached to substrate on sides of joint.

1. Provide where indicated on Drawings.

B. Manufacturer's stainless steel attachment devices. Include anchors, clips, fasteners, set screws, spacers, 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 joint cover assemblies will be installed for installation tolerances and other conditions affecting performance of the Work.

B. Notify Architect where discrepancies occur that will affect proper expansion joint cover assembly installation and performance.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 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 joint cover assemblies 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 in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
2. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation.
3. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
4. Install frames in continuous contact with adjacent surfaces.

a. Shimming is not permitted.

5. Locate anchors at interval recommended by manufacturer, but not less than 3 inches (75 mm) from each end and not more than 24 inches (600 mm) o.c.

C. Elastomeric 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. Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.

D. Preformed Foam Joint Seals: Install in compliance with manufacturer's written instructions. Install with minimum number of end joints.

1. Install each length of seal immediately after removing protective wrapping.
2. Firmly secure compressed joint seals to joint gap side to obtain full bond using exposed pressure-sensitive adhesive or field-applied adhesive as recommended by manufacturer.
3. Do not pull or stretch material. Produce seal continuity at splices, ends, turns, and intersections of joints.
4. For applications at low ambient temperatures, heat foam joint seal material in compliance with manufacturer's written instructions.

E. Install with hairline mitered corners where expansion joint cover assemblies change direction or abut other materials.

F. Terminate exposed ends of expansion joint cover assemblies with field- or factory-fabricated termination devices.

G. Fire-Resistance-Rated Assemblies: Coordinate installation of expansion joint cover assembly materials and associated work so complete assemblies comply with performance requirements.

1. Fire Barriers: Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of joint, including transitions and field splices.

H. Moisture Barrier Drainage: If indicated, provide drainage fitting and connect to drains.

3.4 CONNECTIONS

A. Transition to Roof Expansion Joint Covers: Coordinate installation of exterior wall and soffit expansion joint covers with roof expansion joint covers specified in Section 077129 "Manufactured Roof Expansion Joints." Install factory-fabricated units at transition between exterior walls and soffits and roof expansion joint cover assemblies.

3.5 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.

END OF SECTION 079513.16

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes hollow-metal work.

B. Related Requirements:
   1. Section 087111 "Door Hardware (Descriptive Specification)" for door hardware for hollow-metal doors.

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 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. Elevations of each door type.
   2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
   3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
   4. Locations of reinforcement and preparations for hardware.
   5. Details of each different wall opening condition.
   6. Details of anchorages, joints, field splices, and connections.
   7. Details of accessories.
   8. Details of moldings, removable stops, and glazing.
   9. Details of conduit and preparations for power, signal, and control systems.

C. Samples for Initial Selection: For units with factory-applied color finishes.

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.

1.5 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.

1.6 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 nonvented plastic.

1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch- (102-mm-) high wood blocking. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ceco Door; ASSA ABLOY.
2. Curries Company; ASSA ABLOY.
3. Daybar Industries, Ltd.
4. Gensteel Doors, Inc.
5. Steelcraft; an Allegion brand.

B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

1. Exceptions may include specialty frames.

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.

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.

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. Standard-Duty Doors and Frames: SDI A250.8, Level 1. Resident Unit entry, Offices & General Common Areas.

1. Physical Performance: Level C according to SDI A250.4.
2. Doors:

    a. Type: As indicated in the Door and Frame Schedule.
    b. Thickness: 1-3/4 inches (44.5 mm).
    c. Face: Metallic-coated, cold-rolled steel sheet, minimum thickness of 0.032 inch (0.8 mm).
    d. Edge Construction: Model 1, Full Flush.
    e. Core: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core at manufacturer's discretion.

3. Frames:

    a. Materials: Metallic-coated, cold-rolled steel sheet, minimum thickness of 0.042 inch (1.0 mm).
    b. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
    c. Construction: Face welded.

4. Exposed Finish: Prime.

C. Heavy-Duty Doors and Frames: SDI A250.8, Level 2. Stairtowers, Cross-corridor Fire.

1. Physical Performance: Level B according to SDI A250.4.
2. Doors:

a. Type: As indicated in the Door and Frame Schedule.
b. Thickness: 1-3/4 inches (44.5 mm).
c. Face: Metallic-coated, cold-rolled steel sheet, minimum thickness of 0.042 inch (1.0 mm).
d. Edge Construction: Model 1, Full Flush.
e. Core: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core at manufacturer's discretion.

3. Frames:

a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm).
b. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
c. Construction: Face welded.

4. Exposed Finish: Prime.
5. Cross-corridor doors: Provide Steelcraft DE16 at cross-corridor double egress doors with pairs of 2’-10” wide leafs. Swing clear hinges are required to meet minimum clearance.

D. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3. Back of house service areas including Kitchen, Laundry & Maintenance.

1. Physical Performance: Level A according to SDI A250.4.
2. Doors:

a. Type: As indicated in the Door and Frame Schedule.
b. Thickness: 1-3/4 inches (44.5 mm).
c. Face: Metallic-coated, cold-rolled steel sheet, minimum thickness of 0.053 inch (1.3 mm).
d. Edge Construction: Model 1, Full Flush.
e. Core: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core at manufacturer's discretion.

3. Frames:

a. Materials: Metallic-coated, steel sheet, minimum thickness of 0.053 inch (1.3 mm).
b. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
c. Construction: Full profile welded.

4. Exposed Finish: Prime.

2.4 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

A. Construct exterior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3. All exterior doors.

1. Physical Performance: Level A according to SDI A250.4.
2. Doors:

   a. Type: As indicated in the Door and Frame Schedule.
   b. Thickness: 1-3/4 inches (44.5 mm.)
   c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm), with minimum A40 (ZF120) coating.
   d. Edge Construction: Model 1, Full Flush.
   e. Core: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core at manufacturer's discretion.

3. Frames:

   a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm), with minimum A40 (ZF120) coating.
   b. Construction: Full profile welded.

4. Exposed Finish: Prime.

2.5 BORROWED LITES

A. Hollow-metal frames of metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm).

B. Construction: Full profile welded.

2.6 HOLLOW-METAL PANELS

A. Provide hollow-metal panels of same materials, construction, and finish as adjacent door assemblies.

2.7 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch (1.0 mm) thick, with corrugated or perforated straps not less than 2 inches (51 mm) wide by 10 inches (254 mm) long; or wire anchors not less than 0.177 inch (4.5 mm) thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.
3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
4. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-(9.5-mm-) 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 (1.0 mm), and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch (51-mm) height adjustment. Terminate bottom of frames at finish floor surface.

2.8 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

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 (12G) coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: 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 (102 mm), 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 (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.9 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. Steel-Stiffened Door Cores: Provide minimum thickness 0.026 inch (0.66 mm), steel vertical stiffeners of same material as face sheets extending full-door height, with vertical webs spaced not more than 6 inches (152 mm) apart. Spot weld to face sheets no more than 5 inches (127 mm) o.c. Fill spaces between stiffeners with glass- or mineral-fiber insulation.
2. Fire Door Cores: As required to provide fire-protection and temperature-rise ratings indicated.
3. Vertical Edges for Single-Acting Doors: Bevel edges 1/8 inch in 2 inches (3.2 mm in 51 mm).
4. Top Edge Closures: Close top edges of doors with inverted closures, except provide flush closures at exterior doors of same material as face sheets.
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. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
7. 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 (19 mm) beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

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 (406 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c., to match coursing, and as follows:

        1) Two anchors per jamb up to 60 inches (1524 mm) high.
        2) Three anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
        3) Four anchors per jamb from 90 to 120 inches (2286 to 3048 mm) high.
        4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 120 inches (3048 mm) high.

b. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:

1) Three anchors per jamb up to 60 inches (1524 mm) high.
2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
3) Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) high.
4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 96 inches (2438 mm) high.

c. Compression Type: Not less than two anchors in each frame.
d. Postinstalled Expansion Type: Locate anchors not more than 6 inches (152 mm) from top and bottom of frame. Space anchors not more than 26 inches (660 mm) o.c.

6. Head Anchors: Two anchors per head for frames more than 42 inches (1067 mm) wide and mounted in metal-stud partitions.
7. Door Silencers: Except on weather-stripped and smoke gasket 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.

F. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Provide loose stops and moldings on inside of hollow-metal work.
5. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.10 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.

2.11 ACCESSORIES

A. Louvers: Provide louvers for interior doors, where indicated, which comply with SDI 111C, with blades or baffles formed of 0.020-inch- (0.5-mm-) thick, cold-rolled steel sheet set into 0.032-inch- (0.8-mm-) thick steel frame.

1. Sightproof Louver: Stationary louvers constructed with inverted-V or inverted-Y blades.

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 (0.4 mm) 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. 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.

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.
    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.

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 (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch (1.6 mm), 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 (3.2 mm) plus or minus 1/32 inch (0.8 mm).
    b. Between Edges of Pairs of Doors: 1/8 inch (3.2 mm) to 1/4 inch (6.3 mm) plus or minus 1/32 inch (0.8 mm).
    c. At Bottom of Door: 3/4 inch (19.1 mm) plus or minus 1/32 inch (0.8 mm).

d. Between Door Face and Stop: 1/16 inch (1.6 mm) to 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).

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. 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 (230 mm) o.c. and not more than 2 inches (51 mm) 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 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Solid-core flush wood doors with plastic-laminate-faces.
2. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Requirements:
1. Section 088000 "Glazing" for glass view panels in flush wood doors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product, including the following:

1. Door core materials and construction.
2. Door edge construction
3. Door face type and characteristics.
4. Door louvers.
5. Door trim for openings.
6. Door frame construction.
7. Factory-machining criteria.
8. Factory- finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data; and the following:

1. Door schedule indicating door and frame location, type, size, fire protection rating, and swing.
2. Door elevations, dimension and locations of hardware, lite and louver cutouts, and glazing thicknesses.
3. Details of frame for each frame type, including dimensions and profile.
4. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
5. Dimensions and locations of blocking for hardware attachment.
6. Dimensions and locations of mortises and holes for hardware.
7. Clearances and undercuts.
8. Requirements for veneer matching.
9. Doors to be factory finished and application requirements.
10. Apply AWI Quality Certification Program label to Shop Drawings.

C. Samples for Initial Selection: For plastic-laminate door faces.

D. Samples for Verification:
1. Plastic laminate, 6 inches (150 mm) square, for each color, texture, and pattern selected.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For door inspector.

1. Fire-Rated Door Inspector: Submit documentation of compliance with NFPA 80, Section 5.2.3.1.
2. Egress Door Inspector: Submit documentation of compliance with NFPA 101, Section 7.2.1.15.4.
3. Submit copy of DHI's Fire and Egress Door Assembly Inspector (FDAI) certificate.

B. Field quality-control reports.

C. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Special warranties.

B. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

C. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.6 QUALITY ASSURANCE

A. Manufacturer's Certification: Licensed participant in AWI's Quality Certification Program.

B. Fire-Rated Door Inspector Qualifications: Inspector for field quality-control inspections of fire-rated door assemblies shall comply with qualifications set forth in NFPA 80, Section 5.2.3.1 and the following:

1. DHI's Fire and Egress Door Assembly Inspector (FDAI) certification.

C. Egress Door Inspector Qualifications: Inspector for field quality-control inspections of egress door assemblies shall comply with qualifications set forth in NFPA 101, Section 7.2.1.15.4 and the following:

1. DHI's Fire and Egress Door Assembly Inspector (FDAI) certification.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in plastic bags or cardboard cartons.

C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.8 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 and relative humidity at levels designed for building occupants for the remainder of construction period.

B. Environmental Limitations: Do not deliver or install doors until building is enclosed and weathertight, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 43 and 70 percent during remainder of construction period.

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace doors and frames that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Delamination of veneer.
b. Warping (bow, cup, or twist) more than 1/4 inch (6.4 mm) in a 42-by-84-inch (1067-by-2134-mm) section.
c. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 76.2-mm) span.

2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors and frames.
3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain flush wood doors from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Wood Door and Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings and temperature-rise limits indicated on Drawings, based on testing at positive pressure in accordance with UL 10C or NFPA 252.

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.

B. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing in accordance with UL 1784 and installed in compliance with NFPA 105.

2.3 FLUSH WOOD DOORS AND FRAMES, GENERAL

A. Quality Standard: In addition to requirements specified, comply with AWI/AWMAC/WI's "Architectural Woodwork Standards." ANSI/WDMA I.S. 1A.

1. Provide labels and certificates from AWI certification program indicating that doors and frames comply with requirements of grades specified.
   a. Contractor shall register the Work under this Section with the AWI Quality Certification Program at www.awiqcp.org or by calling 855-345-0991.

2. The Contract Documents contain requirements that are more stringent than the referenced quality standard. Comply with the Contract Documents in addition to those of the referenced quality standard.

2.4 SOLID-CORE FLUSH WOOD DOORS WITH PLASTIC-LAMINATE FACES

A. Interior Doors:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Construction Specialties, Acrovyn.
   b. Masonite Architectural.
   c. Oshkosh Door Company.
   d. VT Industries Inc.
2. Performance Grade: ANSI/WDMA I.S. 1A Extra Heavy Duty.

3. Architectural Woodwork Standards ANSI/WDMA I.S. 1A Grade: Premium.
4. Plastic-Laminate Faces: High-pressure decorative laminates complying with NEMA LD 3, Grade HSH.
5. Colors, Patterns, and Finishes: As selected by Architect from laminate manufacturer's full range of products.
6. Exposed Vertical and Top Edges: Plastic laminate that matches faces, applied before faces.

a. Fire-Rated Single Doors: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed vertical edges.
b. Fire-Rated Pairs of Doors: 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.

c. Mineral-Core Doors: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

1) Screw-Holding Capability: 550 lbf (2440 N) in accordance with WDMA T.M. 10.

7. Core for Non-Fire-Rated Doors:

a. ANSI A208.1, Grade LD-1 particleboard.

1) Blocking: Provide wood blocking in particleboard-core doors as follows:

a) 5-inch (125-mm) top-rail blocking, in doors indicated to have closers.
b) 5-inch (125-mm) bottom-rail blocking, in exterior doors and doors indicated to have kick, mop, or armor plates.
c) 5-inch (125-mm) midrail blocking, in doors indicated to have exit devices.

8. Core for Fire-Rated Doors: As required to achieve fire-protection rating indicated on Drawings.

a. Blocking for Mineral-Core Doors: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated on Drawings as follows:

1) 5-inch (125-mm) top-rail blocking.
2) 5-inch (125-mm) bottom-rail blocking, in doors indicated to have protection plates.
3) 5-inch (125-mm) midrail blocking, in doors indicated to have armor plates.
4) 4-1/2-by-10-inch (114-by-250-mm) lock blocks, in doors indicated to have exit devices.

9. Construction: Five plies, hot-pressed or cold-pressed bonded (vertical and horizontal edging is bonded to core), with entire unit abrasive planed before faces and crossbands are applied.

2.5 LIGHT FRAMES AND LOUVERS

A. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch- (1.2-mm-) thick, cold-rolled steel sheet; with baked-enamel- or powder-coated finish; and approved for use in doors of fire-protection rating indicated on Drawings.

B. Metal Louvers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Allegion plc.
   b. Anemostat Products; a Mestek company.
   c. ASSA ABLOY.
   d. Construction Specialties Inc.

2. Blade Type: Vision-proof, inverted V.
3. Metal and Finish: Hot-dip galvanized steel, 0.040 inch (1.0 mm) thick, with baked-enamel- or powder-coated finish.

2.6 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated.

1. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
2. Comply with NFPA 80 requirements for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied.

1. Locate hardware to comply with DHI-WDHS-3.
2. Comply with final hardware schedules, door frame Shop Drawings, ANSI/BHMA-156.115-W, and hardware templates.
3. Coordinate with hardware mortises in metal frames, to verify dimensions and alignment before factory machining.
4. For doors scheduled to receive electrified locksets, provide factory-installed raceway and wiring to accommodate specified hardware.
5. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

C. Transom and Side Panels:

1. Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors.
2. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.
3. Fabricate door and transom panels with full-width, solid-lumber, rabbeted, meeting rails.
4. 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.

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 087111 "Door Hardware (Descriptive Specification)."

B. Install doors and frames to comply with manufacturer's written instructions and referenced quality standard, and as indicated.

C. Install frames level, plumb, true, and straight.

1. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3.2 mm in 2400 mm).
2. Anchor frames to anchors or blocking built in or directly attached to substrates.

    a. Secure with countersunk, concealed fasteners and blind nailing.
    b. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.

        1) For factory-finished items, use filler matching finish of items being installed.

3. Install fire-rated doors and frames in accordance with NFPA 80.
4. Install smoke- and draft-control doors in accordance with NFPA 105.

D. Job-Fitted Doors:

1. Align and fit doors in frames with uniform clearances and bevels as indicated below.

    a. Do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors.

2. Machine doors for hardware.
3. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
4. Clearances:

    a. Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors.
    b. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering unless otherwise indicated on Drawings.

c. Where threshold is shown or scheduled, provide1/4 inch (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.
d. Comply with NFPA 80 for fire-rated doors.

5. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
6. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock edge; trim stiles and rails only to extent permitted by labeling agency.

E. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

F. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 FIELD QUALITY CONTROL

A. Inspection Agency: Engage a qualified inspector to perform inspections and to furnish reports to Architect.

B. Inspections:

1. Provide inspection of installed Work through AWI's Quality Certification Program, certifying that wood doors and frames, including installation, comply with requirements of AWI/AWMCA/WI's "Architectural Woodwork Standards" for the specified grade.
2. Fire-Rated Door Inspections: Inspect each fire-rated door in accordance with NFPA 80, Section 5.2.
3. Egress Door Inspections: Inspect each door equipped with panic hardware, each door equipped with fire exit hardware, each door located in an exit enclosure, each electrically controlled egress door, and each door equipped with special locking arrangements in accordance with NFPA 101, Section 7.2.1.15.

C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

E. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80 and NFPA 101.

3.4 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 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Access doors and frames.
2. Fire-rated access doors and frames.

B. Related Requirements:

1. Section 077200 "Roof Accessories" for roof hatches.
2. Section 083113.53 "Security Access Doors and Frames" for access doors and frames for security applications.
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. Samples: For each type of access door and frame and for each finish specified, complete assembly minimum 6 by 6 inches (150 by 150 mm) in size.

C. Product Schedule: For access doors and frames. Use same designations indicated on Drawings.

D. Coordination Drawings: Provide plans for review and approval by Architect identifying all locations requiring access doors either as specifically designated on Drawings or as required to provide access to any dampers, valves or junction boxes located in rigid ceilings and walls.

1.3 CLOSEOUT SUBMITTALS

A. Record Documents: For fire-rated doors, list of applicable room name and number in which access door is located.

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

A. Flush Access Doors with Exposed Flanges IAP:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Babcock-Davis.
    b. Larsens Manufacturing Company.
    c. Milcor; a division of Hart & Cooley, Inc.
    d. Nystrom.

2. Description: Face of door flush with frame, with exposed flange and concealed hinge.
3. Optional Features: Piano hinges.
4. Locations: Wall and ceiling.
5. Door Size: Varies (As indicated on drawings or as required for access).
6. Metallic-Coated Steel Sheet for Door: Nominal 0.064 inch (1.63 mm), 16 gage, factory primed.
7. Frame Material: Same material, thickness, and finish as door.
8. Latch and Lock: Cam latch, screwdriver operated on ceilings and Cam latch, key operated on walls.

B. Aluminum Flush Access Doors WAP:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Babcock-Davis.
    b. Milcor; a division of Hart & Cooley, Inc.

2. Description: Face of door flush with frame, with exposed flange and concealed hinge.
3. Optional Features: Piano hinges.
4. Locations: Ceiling.
5. Door Size: Varies (As indicated on drawings or as required for access).
6. Aluminum Sheet for Door: Nominal 0.045 inch (1.15 mm), with manufacturer's standard baked-enamel or powder-coat finish.
7. Frame Material: Same material, thickness, and finish as door.
8. Latch and Lock: Cam latch, screwdriver operated.

C. Exterior Flush Access Doors EAP:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Babcock-Davis.
    b. Larsens Manufacturing Company.
    c. Nystrom.

2. Description: Weatherproof assembly, with face of door fit flush with frame and with exposed frame. Include extruded door gaskets and minimum 2-inch- (50-mm-) thick fiberglass insulation.
3. Optional Features: Piano hinges.
4. Locations: Wall and ceiling.
5. Door Size: Varies (As indicated on drawings or as required for access).
6. Stainless Steel Sheet for Door: Nominal 0.062 inch (1.59 mm), 16 gage, ASTM A480/A480M No. 4 finish.
7. Frame Material: Same material, thickness, and finish as door.
8. Latch and Lock: Cam latch operated by handle, without lock on ceilings and with keyed lock in handle on walls.

2.3 FIRE-RATED ACCESS DOORS AND FRAMES

A. Fire-Rated, Flush Access Doors with Exposed Flanges FAP:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Babcock-Davis.
    b. Larsens Manufacturing Company.
    c. Milcor; a division of Hart & Cooley, Inc.
    d. Nystrom.

2. Description: Door face flush with frame, with a core of mineral-fiber insulation enclosed in sheet metal; with exposed flange, self-closing door, and concealed hinge.
3. Optional Features: Gasketing Piano hinges.
4. Locations: Ceiling.
5. Door Size: 22 inches by 36 inches.
6. Fire-Resistance Rating: Not less than 1 hour.
7. Uncoated Steel Sheet for Door: Nominal 0.036 inch (0.91 mm), 20 gage, factory finished.
8. Frame Material: Steel, 0.0625 inch (1.58 mm), 16 gage, factory finished.
9. Latch and Lock: Self-latching door hardware, operated by knurled-knob with interior release.

2.4 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A879/A879M, with cold-rolled steel sheet substrate complying with ASTM A1008/A1008M, Commercial Steel (CS), exposed.

C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

D. Stainless Steel Plate, Sheet, and Strip: ASTM A240/A240M or ASTM A666, Type 316. Remove tool and die marks and stretch lines, or blend into finish.

E. Stainless Steel Flat Bars: ASTM A666, Type 316. Remove tool and die marks and stretch lines, or blend into finish.

F. Aluminum Extrusions: ASTM B221 (ASTM B221M), Alloy 6063.

G. Aluminum Sheet: ASTM B209 (ASTM B209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

H. Frame Anchors: Same material as door face.

I. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329.

2.5 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 mounting holes, 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.
2. For concealed flanges with plaster bead for full-bed plaster applications, provide zinc-coated expanded-metal lath and exposed casing bead welded 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.

1. For recessed doors with plaster infill, provide self-furring expanded-metal lath attached to door panel.

E. Latch and Lock Hardware:

1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.
2. Keys: Furnish two keys per lock and key all locks alike.

F. Aluminum: After fabrication, apply manufacturer's standard protective coating on aluminum that will come in contact with concrete.

2.6 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. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
2. Factory Finished: Apply manufacturer's standard baked-enamel or powder-coat finish immediately after cleaning and pretreating, with minimum dry-film thickness of 1 mil (0.025 mm) for topcoat.

a. Color: As selected by Architect from full range of industry colors.

E. Stainless Steel Finishes:

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
2. Polished Finish: ASTM A480/A480M No. 4 finish. Grind and polish surfaces to produce uniform finish, free of cross scratches.

a. Run grain of directional finishes with long dimension of each piece.
b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

3. Bright, Cold-Rolled, Unpolished Finish: ASTM A480/A480M No. 2B.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates 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 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

3.3 FIELD QUALITY CONTROL

A. Inspections:

1. Fire-Rated Door Inspections: Inspect each fire-rated access door in accordance with NFPA 80, Section 5.2.

B. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

C. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

3.4 ADJUSTING

A. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION 083113

SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior and interior storefront framing.
2. Storefront framing for window walls.
3. Storefront framing for ribbon walls.
4. Storefront framing for punched openings.
5. Exterior and interior manual-swing entrance doors and door-frame units.

B. Related Requirements:

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.

B. System Engineering: Provide Miami-Dade NOA or Florida Product Approval as appropriate for the local jurisdiction.

C. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.

1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
2. 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. Expansion provisions.
d. Glazing.
e. Flashing and drainage.

3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

D. Samples for Initial Selection: For units with factory-applied color finishes.

E. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

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.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

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 a qualified testing agency.

D. Source quality-control reports.

E. Field quality-control reports.

F. Sample Warranties: For special warranties.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

B. Maintenance Data for Structural Sealant: For structural-sealant-glazed storefront to include in maintenance manuals. Include ASTM C 1401 recommendations for post-installation-phase quality-control program.

1.5 QUALITY ASSURANCE

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

B. 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.

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.

C. Structural-Sealant Glazing: Comply with ASTM C 1401 for design and installation of storefront systems.

1.6 MOCKUPS

A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical wall area as shown on Drawings.
2. 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.

1.7 WARRANTY

A. Special Warranty: Manufacturer 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 and other materials beyond normal weathering.
d. Water penetration through fixed glazing and framing areas.
e. Failure of operating components.

2. Warranty Period: 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: 20 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 Structural Drawings.
2. Other Design Loads: As indicated on Structural 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 (4.1 m) and to 1/240 of clear span plus 1/4 inch (6.35 mm) for spans greater than 13 feet 6 inches (4.1 m) or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19.1 mm), 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 (3.2 mm).

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 0.06 cfm/sq. ft. (0.30 L/s per sq. m) at a static-air-pressure differential of 6.24 lbf/sq. ft. (300 Pa).

2. Entrance Doors:

    a. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft. (5.08 L/s per sq. m) at a static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa).
    b. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. (2.54 L/s per sq. m) at a static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa).

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 12 lbf/sq. ft. (575 Pa).

H. 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 0.45 Btu/sq. ft. x h x deg F (2.55 W/sq. m x K) as determined according to NFRC 100.
2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.35 as determined according to NFRC 200.
3. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 55 as determined according to NFRC 500.

I. Noise Reduction: Test according to ASTM E 90, with ratings determined by ASTM E 1332, as follows.

1. Outdoor-Indoor Transmission Class: Minimum 33.

J. Windborne-Debris Impact Resistance: Pass missile-impact and cyclic-pressure tests when tested according to ASTM E 1886 and testing information in ASTM E 1996 for Wind Zone identified on Structural Drawings.

1. Large-Missile Test: For glazed openings located within 30 feet (9.1 m) of grade.

K. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.

    a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F (82 deg C).
    b. Low Exterior Ambient-Air Temperature: 0 deg F (minus 18 deg C).

c. Interior Ambient-Air Temperature: 75 deg F (24 deg C).

L. Structural-Sealant Joints:

1. Designed to carry gravity loads of glazing.
2. Designed to produce tensile or shear stress of less than 20 psi (138 kPa).

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

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Kawneer North America; an Alcoa company.
2. Wausau; Apogee Wausau Group, Inc.
3. YKK AP America Inc.

B. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing spandrel panels 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: Thermally broken.
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Glazing Plane: Front.
4. Finish: High-performance organic 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. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

D. Materials:

1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

    a. Sheet and Plate: ASTM B 209 (ASTM B 209M).
    b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
    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. Door Construction: 1-3/4-inch (44.5-mm) overall thickness, with minimum 0.125-inch-(3.2-mm-) thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.

    a. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.

2. Door Design: Medium stile; 3-1/2-inch (88.9-mm) nominal width.
3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.

    a. Provide nonremovable glazing stops on outside of door.

2.5 ENTRANCE DOOR HARDWARE

A. Entrance Door Hardware: Provide door hardware specified in 087111 “Door Hardware (Descriptive Specification)” Any hardware not specified in Section 087111 "Door Hardware (Descriptive Specification)" and scheduled on the Drawings shall be followed below.

B. General: Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule and entrance door hardware sets indicated in "Entrance Door Hardware Sets" Article for each entrance door to comply with requirements in this Section.

1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products.
2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.

3. Opening-Force Requirements:

    a. Egress Doors: Not more than 15 lbf (67 N) to release the latch and not more than 30 lbf (133 N)to set the door in motion and not more than 15 lbf (67 N) to open the door to its minimum required width.
    b. Accessible Interior Doors: Not more than 5 lbf (22.2 N) 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. Butt Hinges: BHMA A156.1, Grade 1, radius corner.

1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while entrance door is closed.
2. Exterior Hinges: Stainless steel, with stainless-steel pin.
3. Quantities:

    a. For doors up to 87 inches (2210 mm) high, provide three hinges per leaf.
    b. For doors more than 87 and up to 120 inches (2210 and up to 3048 mm) high, provide four hinges per leaf.

E. Mortise Auxiliary Locks: BHMA A156.5, Grade 1.

F. Manual Flush Bolts: BHMA A156.16, Grade 1.

G. Automatic and Self-Latching Flush Bolts: BHMA A156.3, Grade 1.

H. Panic Exit Devices: BHMA A156.3, Grade 1, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

I. Cylinders: As specified in Section 087100 "Door Hardware." BHMA A156.5, Grade 1.

1. Keying: Master key system. Permanently inscribe each key with a visual key control number and include notation "DO NOT DUPLICATE".

J. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.

K. Operating Trim: BHMA A156.6.

L. Removable Mullions: BHMA A156.3, extruded aluminum.

1. When used with panic exit devices, provide removable mullions listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic

protection, based on testing according to UL 305. Use only mullions that have been tested with exit devices to be used.

M. Closers: BHMA A156.4, Grade 1, with accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to comply with field conditions and requirements for opening force.

N. Concealed Overhead Holders: BHMA A156.8, Grade 1.

O. Surface-Mounted Holders: BHMA A156.16, Grade 1.

P. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.

Q. Weather Stripping: Manufacturer's standard replaceable components.

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.

R. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

S. Silencers: BHMA A156.16, Grade 1.

T. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch (12.7 mm).

U. 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 Sealants: As recommended by manufacturer. Comply with Section 088000 "Glazing."

C. Sealants used inside the weatherproofing system shall have a VOC content of 250 g/L.

D. Structural Glazing Sealants: ASTM C 1184, chemically curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by structural-sealant manufacturer for use in storefront system indicated.

1. Color: As selected by Architect from manufacturer's full range of colors.

E. 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 structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed storefront manufacturers for this use.

1. 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. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.

B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch (25.4 mm) 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: Dead-soft, 0.018-inch- (0.457-mm-) thick stainless steel, ASTM A 240/A 240M of type recommended by manufacturer.

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

2.8 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 for vision glass and exterior for spandrel glazing or metal panels.
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. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.

F. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

1. At exterior doors, provide compression weather stripping at fixed stops.
2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.

G. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
2. At exterior doors, provide weather sweeps applied to door bottoms.

H. 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. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF or FEVE 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: White with gloss to be selected by Architect from maufacturer’s standard options.

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 structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

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 nonmovement 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.

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.

E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

F. Install glazing as specified in Section 088000 "Glazing."

G. 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.

H. 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 (3.2 mm in 3 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
2. Level: 1/8 inch in 20 feet (3.2 mm in 6 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
3. Alignment:

    a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch (12.7 mm) wide, limit offset from true alignment to 1/16 inch (1.6 mm).
    b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch (12.7 to 25.4 mm) wide, limit offset from true alignment to 1/8 inch (3.2 mm).
    c. Where surfaces are separated by reveal or protruding element of 1 inch (25.4 mm) wide or more, limit offset from true alignment to 1/4 inch (6 mm).

4. Location: Limit variation from plane to 1/8 inch in 12 feet (3.2 mm in 3.6 m); 1/2 inch (12.7 mm) 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 mockups.

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 a minimum of two tests in areas as directed by Architect.

C. Structural-Sealant Adhesion: Test structural sealant according to recommendations in ASTM C 1401, Destructive Test Method A, "Hand Pull Tab (Destructive)," Appendix X2.

1. Test a minimum of two areas on each building facade.
2. Repair installation areas damaged by testing.

D. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

3.6 MAINTENANCE SERVICE

A. Entrance Door Hardware:

1. 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 entrance door hardware.

2. Initial Maintenance Service: Beginning at Substantial Completion, provide six months' full maintenance by skilled employees of entrance door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door hardware operation at rated speed and capacity. Use parts and supplies that are the same as those used in the manufacture and installation of original equipment.

3.7 ENTRANCE DOOR HARDWARE SETS

END OF SECTION 084113

SECTION 084229.23 - SLIDING AUTOMATIC ENTRANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes exterior and interior, sliding, power-operated automatic entrances.

B. Related Requirements:
   1. Section 087113 "Automatic Door Operators" for automatic door operators furnished separately from doors and frames.

1.3 DEFINITIONS

A. AAADM: American Association of Automatic Door Manufacturers.

B. Activation Device: A control that, when actuated, sends an electrical signal to the door operator to open the door.

C. IBC: International Building Code.

D. FBC: Florida Building Code.

E. Safety Device: A control that, to avoid injury, prevents a door from opening or closing.

F. For automatic door terminology, refer to BHMA A156.10 for definitions of terms.

1.4 COORDINATION

A. Coordinate sizes and locations of recesses in concrete floors for recessed sliding tracks that control automatic entrances. Concrete, reinforcement, and formwork requirements are specified elsewhere.

B. Templates: Distribute for doors, frames, and other work specified to be factory prepared for installing automatic entrances.

C. Coordinate hardware with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish. Coordinate hardware for automatic entrances with hardware required for rest of Project.

D. Electrical System Roughing-in: Coordinate layout and installation of automatic entrances with connections to power supplies and access-control system.

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 for automatic entrances.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For automatic entrances.

1. Include plans, elevations, sections, hardware mounting heights, and attachment details.
2. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.
4. Indicate locations of activation and safety devices.
5. Include hardware schedule and indicate hardware types, functions, quantities, and locations.

C. Samples for Initial Selection: For units with factory-applied color finishes.

1. Include Samples of hardware and accessories involving color or finish selection.

D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

E. Engineering: Provide Miami-Dade NOA or Florida Product Approval.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of automatic entrance. Include emergency-exit features of automatic entrances serving as a required means of egress.

C. Product Test Reports: For each type of automatic entrance, for tests performed by a qualified testing agency.

D. Field quality-control reports.

E. Sample Warranties: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For automatic entrances, safety devices, and control systems to include in operation and maintenance manuals.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer with company certificate issued by AAADM indicating that manufacturer has a Certified Inspector on staff.

B. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation and maintenance of units required for this Project and who employs a Certified Inspector.

1. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.

C. Certified Inspector Qualifications: Certified by AAADM.

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of automatic entrances 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. Faulty operation of operators, controls, and hardware.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Finish Warranty: Manufacturer agrees to repair or replace components on which finishes fail in materials or workmanship 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: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 AUTOMATIC ENTRANCE ASSEMBLIES

A. Source Limitations: Obtain sliding automatic entrances from single source from single manufacturer.

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.

C. Power-Operated Door Standard: BHMA A156.10.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design automatic entrances.

B. Structural Performance: Automatic entrances shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Seismic Loads: As noted on Structural Drawings.
2. Wind Loads: As noted on Structural Drawings.

C. Windborne-Debris Impact Resistance: Automatic entrances shall pass large-missile-impact and cyclic-pressure tests of ASTM E 1996 according to the IBC (FBC) for Wind Zone noted on Structural Drawings.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

E. Operating Temperature Range: Automatic entrances shall operate within minus 20 to plus 122 deg F (minus 29 to plus 50 deg C).

F. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of 1.25 cfm/sq. ft. (6.4 L/s x sq. m) of fixed entrance-system area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 1.57 lbf/sq. ft. (75 Pa).

G. Opening Force:

1. Power-Operated Doors: Not more than 50 lbf (222 N) required to manually set door in motion if power fails, and not more than 15 lbf (67 N) required to open door to minimum required width.
2. Breakaway Device for Power-Operated Doors: Not more than 50 lbf (222 N) required for a breakaway door or panel to open.

H. Entrapment-Prevention Force:

1. Power-Operated Sliding Doors: Not more than 30 lbf (133 N) required to prevent stopped door from closing.

2.3 SLIDING AUTOMATIC ENTRANCES

A. General: Provide manufacturer's standard automatic entrances including doors, sidelites, framing, headers, carrier assemblies, roller tracks, door operators, controls, and accessories required for a complete installation.

B. Sliding Automatic Entrance:

1. Single- and Biparting-Sliding Units:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Besam Entrance Solutions; an ASSA ABLOY Group Company.
2) Stanley Access Technologies.

2. Configuration: Single-sliding door with one sliding leaf, transom, and sidelite.

a. Traffic Pattern: Two way.
b. Emergency Breakaway Capability: Sliding leaf and sidelite.
c. Mounting: Between jambs.

3. Configuration: Biparting-sliding doors with two sliding leaves, transom, and sidelites on each side.

a. Traffic Pattern: Two way.
b. Emergency Breakaway Capability: Sliding leaves and sidelites.
c. Mounting: Between jambs.

4. Operator Features:

a. Power opening and closing.
b. Drive System: Chain.
c. Adjustable opening and closing speeds.
d. Adjustable hold-open time between zero and 30 seconds.
e. Obstruction recycle.
f. On-off/hold-open switch to control electric power to operator, key operated.
g. Integrated control relay for remote and/or card access.

5. Sliding-Door Carrier Assemblies and Overhead Roller Tracks: Carrier assembly that allows vertical adjustment; consisting of nylon- or delrin-covered, ball-bearing-center steel wheels operating on a continuous roller track, or ball-bearing-center steel wheels operating on a nylon- or delrin-covered, continuous roller track. Support doors from carrier assembly by cantilever and pivot assembly.

a. Rollers: Minimum of two ball-bearing roller wheels and two antirise rollers for each active leaf.

6. Sliding-Door Threshold: Threshold members and bottom-guide-track system with stainless-steel, ball-bearing-center roller wheels.

a. Configuration: Saddle-type threshold across door opening and surface-mounted guide-track system at sidelites.

7. Controls: Activation and safety devices as indicated on Drawings and according to BHMA standards.

a. Activation Device: Motion sensor mounted on each side of door header to detect pedestrians in activating zone and to open door.
b. Safety Device: Presence sensor mounted to underside of door header and two photoelectric beams mounted in sidelite jambs on one side of the door to detect pedestrians in presence zone and to prevent door from closing.
c. Sidelite Safety Device: Presence sensor, mounted above each sidelite on side of door opening through which doors travel, to detect obstructions and to prevent door from opening.
d. Opening-Width Control: Two-position switch that in the normal position allows sliding doors to travel to full opening width and in the alternate position reduces opening to a selected partial opening width.

8. Finish: Finish framing, door(s), and header with high-performance organic finish (three-coat fluoropolymer) finish matching adjacent storefront.

a. Color: As selected by Architect from full range of industry colors and color densities.

2.4 ENTRANCE COMPONENTS

A. Framing Members: Extruded aluminum, minimum 0.125 inch (3.2 mm) thick and reinforced as required to support imposed loads.

1. Nominal Size: 1-3/4 by 6 inches (45 by 150 mm).
2. Extruded Glazing Stops and Applied Trim: Minimum 0.062-inch (1.6-mm) wall thickness.

B. Stile and Rail Doors: 1-3/4-inch- (45-mm-) thick, glazed doors with minimum 0.125-inch- (3.2-mm-) thick, extruded-aluminum tubular stile and rail members. Mechanically fasten corners with reinforcing brackets that are welded, or incorporate concealed tie-rods that span full length of top and bottom rails.

1. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.
2. Stile Design: Wide stile, more than 4-inch (100-mm) nominal width.
3. Rail Design: 10-inch (254-mm) nominal height.
4. Muntin Bars: Horizontal tubular rail member for each door; match stile design and finish.

C. Sidelite(s) and Transom: 1-3/4-inch- (45-mm-) deep sidelite(s) and transom with minimum 0.125-inch- (3.2-mm-) thick, extruded-aluminum tubular stile and rail members matching door design.

1. Glazing Stops and Gaskets: Same materials and design as for stile and rail door.
2. Muntin Bars: Horizontal tubular rail members for each sidelite; match stile design.

D. Headers: Fabricated from minimum 0.125-inch- (3.2-mm-) thick extruded aluminum and extending full width of automatic entrance units to conceal door operators and controls. Provide hinged or removable access panels for service and adjustment of door operators and controls. Secure panels to prevent unauthorized access.

1. Mounting: Concealed, with one side of header flush with framing.
2. Capacity: Capable of supporting doors up to 175 lb (79 kg) per leaf over spans up to 14 feet (4.3 m) without intermediate supports.

    a. Provide sag rods for spans exceeding 14 feet (4.3 m).

E. Brackets and Reinforcements: High-strength aluminum with nonstaining, nonferrous shims for aligning system components.

F. Signage: As required by cited BHMA standard.

1. Application Process: Door manufacturer's standard process.
2. Provide sign materials with instructions for field application after glazing is installed.

2.5 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Extrusions: ASTM B 221 (ASTM B 221M).
2. Sheet: ASTM B 209 (ASTM B 209M).

B. Steel Reinforcement: Reinforcement with corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Use surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

C. Stainless-Steel Bars: ASTM A 276 or ASTM A 666, Type 304.

D. Stainless-Steel Tubing: ASTM A 554, Grade MT 304.

E. Glazing: As specified in Section 088000 "Glazing."

F. Sealants and Joint Fillers: As specified in Section 079200 "Joint Sealants."

G. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout; complying with ASTM C 1107/C 1107M; of consistency suitable for application.

H. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

I. Fasteners and Accessories: Corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

2.6 DOOR OPERATORS AND CONTROLS

A. General: Provide operators and controls, which include activation and safety devices, according to BHMA standards, for condition of exposure, and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated.

B. Door Operators: Provide door operators of size recommended by manufacturer for door size, weight, and movement.

1. Door Operator Performance: Door operators shall open and close doors and maintain them in fully closed position when subjected to Project's design wind loads.
2. Electromechanical Operators: Concealed, self-contained, overhead unit powered by fractional-horsepower, permanent-magnet dc motor; with closing speed controlled mechanically by gear train and dynamically by braking action of electric motor; with solid-state microprocessor controller; UL 325; and with manual operation with power off.

C. Motion Sensors: Self-contained, K-band-frequency, microwave-scanner units; fully enclosed by its plastic housing; adjustable to provide detection-field sizes and functions required by BHMA A156.10.

1. Provide capability for switching between bidirectional and unidirectional detection.
2. For one-way traffic, sensor on egress side shall not be active when doors are fully closed.

D. Presence Sensors: Self-contained, active-infrared scanner units; adjustable to provide detection-field sizes and functions required by BHMA A156.10. Sensors shall remain active at all times.

E. Key Switch: Recess-mounted, door-control switch with key-controlled actuator; enclosed in 2-by-4-inch (50-by-100-mm) junction box. Provide faceplate engraved with letters indicating switch functions.

1. Face-Plate Material: Painted metal as selected by Architect from manufacturer's full range.
2. Functions: Two-way automatic, hold open, one-way exit, off, full open, and partial open.
3. Mounting: Recess mounted, semiflush in wall.

F. Security Integration Relay: Provide additional integration relays for designated security doors that allow key fob or code reader access.

G. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.

2.7 HARDWARE

A. General: Provide units in sizes and types recommended by automatic entrance and hardware manufacturers for entrances and uses indicated. Finish exposed parts to match door finish unless otherwise indicated.

B. Breakaway Device for Power-Operated Doors: Device that allows door to swing out in direction of egress to full 90 degrees from any operating position. Maximum force to open door shall be as stipulated in "Performance Requirements" Article. Interrupt powered operation of door operator while in breakaway mode.

C. Automatic Locking: Electrically controlled device mounted in header that automatically locks sliding door against sliding when in closed position. Provide fail secure operation if power fails.

1. Include concealed, vertical-rod exit devices, UL 305, with latching into threshold and overhead carrier assembly and released by full-width panic bar; and that prevent emergency breakaway doors from swinging unless released to permit emergency egress.
2. Include locking devices for sidelites to prevent manual break out.

D. Weather Stripping: Replaceable components.

1. Sliding Type: AAMA 701, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

2.8 FABRICATION

A. General: Factory fabricate automatic entrance components to designs, sizes, and thicknesses indicated and to comply with indicated standards.

1. Form aluminum shapes before finishing.
2. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
3. Use concealed fasteners to greatest extent possible. Where exposed fasteners are required, use countersunk Phillips flat-head machine screws, finished to match framing.

    a. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
    b. Reinforce members as required to receive fastener threads.

4. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.

B. Framing: Provide automatic entrances as prefabricated assemblies. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to Project site.

1. Fabricate tubular and channel frame assemblies with welded or mechanical joints. Provide subframes and reinforcement as required for a complete system to support required loads.
2. Perform fabrication operations in manner that prevents damage to exposed finish surfaces.
3. Form profiles that are sharp, straight, and free of defects or deformations.
4. Provide components with concealed fasteners and anchor and connection devices.
5. Fabricate components with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion.
6. Fabricate exterior components to drain condensation and water passing joints within system to the exterior.
7. Provide anchorage and alignment brackets for concealed support of assembly from building structure.
8. Allow for thermal expansion of exterior units.

C. Doors: Factory fabricated and assembled in profiles indicated. Reinforce as required to support imposed loads and for installing hardware.

D. Door Operators: Factory fabricated and installed in headers, including adjusting and testing.

E. Glazing: Fabricate framing with minimum glazing edge clearances for thickness and type of glazing indicated, according to GANA's "Glazing Manual."

F. Hardware: Factory install hardware to greatest extent possible; remove only as required for final finishing operation and for delivery to and installation at Project site. Cut, drill, and tap for factory-installed hardware before applying finishes.

1. Provide sliding-type weather stripping, mortised into door, at perimeter of doors and breakaway sidelites.

G. Controls:

1. General: Factory install activation and safety devices in doors and headers as required by BHMA A156.10 for type of door and direction of travel.
2. Install photoelectric beams in vertical jambs of sidelites, with dimension above finished floor as follows:

a. Top Beam: 48 inches (1219 mm).
b. Bottom Beam: 24 inches (610 mm).

2.9 GENERAL FINISH REQUIREMENTS

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

B. Apply organic and anodic finishes to formed metal after fabrication unless otherwise indicated.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.10 ALUMINUM FINISHES

A. High-Performance Organic Finish: Three-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of automatic entrances.

B. Examine roughing-in for electrical systems to verify actual locations of power connections before automatic entrance installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install automatic entrances according to manufacturer's written instructions and cited BHMA standard for direction of pedestrian travel, including signage, controls, wiring, and connection to the building's power supply.

1. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.
2. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
3. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous coating.

B. Entrances: Install automatic entrances plumb and true in alignment with established lines and grades without warp or rack of framing members and doors. Anchor securely in place.

1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
2. Set headers, carrier assemblies, tracks, operating brackets, and guides level and true to location with anchorage for permanent support.
3. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within system to exterior.
4. Level recesses for recessed thresholds using nonshrink grout.

C. Door Operators: Connect door operators to electrical power distribution system.

D. Access-Control Devices: Connect access-control devices to access-control system as specified in Section 281300 "Access Control."

E. Controls: Install and adjust activation and safety devices according to manufacturer's written instructions and cited BHMA standard for direction of pedestrian travel. Connect control wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

F. Glazing: Install glazing as specified in Section 088000 "Glazing."

G. Sealants: Comply with requirements specified in Section 079200 "Joint Sealants" to provide weathertight installation.

1. Set thresholds, bottom-guide-track system, framing members and flashings in full sealant bed.
2. Seal perimeter of framing members with sealant.

H. Signage: Apply signage on both sides of each door and breakaway sidelite as required by cited BHMA standard for direction of pedestrian travel.

I. Wiring within Automatic Entrance Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's written limitations on bending radii. Provide and use lacing bars and distribution spools.

3.3 FIELD QUALITY CONTROL

A. Certified Inspector: Engage a Certified Inspector to test and inspect components, assemblies, and installations, including connections.

B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Test and inspect each automatic entrance, using AAADM inspection forms, to determine compliance of installed systems with applicable BHMA standards.

C. Automatic entrances will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.4 ADJUSTING

A. Adjust hardware, moving parts, door operators, and controls to function smoothly, and lubricate as recommended by manufacturer; comply with requirements of applicable BHMA standards.

1. Adjust exterior doors for weathertight closure.

B. Readjust door operators and controls after repeated operation of completed installation equivalent to three days' use by normal traffic (100 to 300 cycles).

C. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.5 CLEANING

A. Clean glass and metal surfaces promptly after installation. Remove excess glazing and sealant compounds, dirt, and other substances. Repair damaged finish to match original finish.

1. Comply with requirements in Section 088000 "Glazing" for cleaning and maintaining glass.

3.6 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of automatic entrance Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper automatic entrance operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

1. Engage a Certified Inspector to perform safety inspection after each adjustment or repair and at end of maintenance period. Furnish completed inspection reports to Owner.
2. Perform maintenance, including emergency callback service, during normal working hours.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain automatic entrances.

END OF SECTION 084229.23

SECTION 085313 - VINYL WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes vinyl-framed windows.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation 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, discuss, and coordinate the interrelationship of vinyl windows with 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.

1.4 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 vinyl windows.

B. Shop Drawings: For vinyl 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 each exposed product and for each color specified, 2 by 4 inches (50 by 100 mm) in size.

D. Product Schedule: For vinyl windows. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer and Installer.

B. Product Test Reports: For each type of vinyl window, for tests performed by a qualified testing agency.

C. Field quality-control reports.

D. Sample Warranties: For manufacturer's warranties.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer capable of fabricating vinyl windows that meet or exceed performance requirements indicated and of documenting this performance by test reports and calculations.

B. Installer Qualifications: An installer acceptable to vinyl window manufacturer for installation of units required for this Project.

C. 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.

1.7 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace vinyl 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, 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:

a. Window: 10 years from date of Substantial Completion.
b. Glazing Units: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain vinyl windows from single source from single manufacturer.

2.2 WINDOW PERFORMANCE REQUIREMENTS

A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

1. Window Certification: WDMA certified with label attached to each window.

B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:

1. Minimum Performance Class: CW.
2. Minimum Performance Grade: 45 or higher as indicated on Structural Drawing S0.5.

C. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.60 Btu/sq. ft. x h x deg F (3.43 W/sq. m x K).

D. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC of 0.27.

E. Sound Transmission Class (STC): Rated for not less than 30 STC when tested for laboratory sound transmission loss according to ASTM E90 and determined by ASTM E413.

F. Outside-Inside Transmission Class (OITC): Rated for not less than 30 OITC when tested for laboratory sound transmission loss according to ASTM E90 and determined by ASTM E1332.

G. Windborne-Debris Impact Resistance: Passes ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone 3 for enhanced protection.

1. Large-Missile Test: For glazing located within 30 feet (9.1 m) of grade.
2. Small-Missile Test: For glazing located between 30 feet (9.1 m) and 60 feet (18.3 m) above grade.

H. Windborne-Debris-Impact Resistance: Capable of resisting impact from windborne debris based on testing glazed windows identical to those specified, according to ASTM E1886 and testing information in ASTM E1996 , FBC and requirements of authorities having jurisdiction.

2.3 VINYL WINDOWS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. JELD-WEN, Inc.
2. Pella Corporation.
3. PGT Industries.

4. YKK AP America Inc.

B. Operating Types: Provide the following operating types in locations indicated on Drawings:

1. Casement: Project out.
2. Awning: Project out.
3. Single hung.
4. Double hung.
5. Horizontal sliding.
6. Fixed.

C. Frames and Sashes: Impact-resistant, UV-stabilized PVC complying with AAMA/WDMA/CSA 101/I.S.2/A440.

1. Finish: Integral color, white.
2. Gypsum Board Returns: Provide at interior face of frame.

D. Windborne-Debris-Impact-Resistant Insulating-Glass Units: ASTM E2190 with two lites and complying with impact-resistance requirements in "Window Performance Requirements" Article.

1. Exterior Lite: ASTM C1036, Type 1, Class 1, q3.

a. Tint: Clear.
b. Kind: Fully tempered.

2. Interior Lite: ASTM C1172 clear laminated glass with two plies of float glass.

a. Float Glass: Fully tempered.
b. Interlayer Thickness: 0.090 inch (2.29 mm).

3. Filling: Fill space between glass lites with air.
4. Low-E Coating: Sputtered on second or third surface.

E. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.

F. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock windows, and sized to accommodate sash weight and dimensions.

1. Exposed Hardware Color and Finish: Bronze fluoropolymer or powder coat finish.

G. Hung Window Hardware:

1. Counterbalancing Mechanism: Complying with AAMA 902, concealed, of size and capacity to hold sash stationary at any open position.
2. Locks and Latches: Allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only. Provide limiter installed with tamper resistant screws to prevent window from opening more than 6” (six inches).

3. Tilt Hardware: Shall not be provided.

H. Horizontal-Sliding Window Hardware:

1. Sill Cap/Track: Extruded-aluminum track with natural anodized finish of dimensions and profile indicated; designed to comply with performance requirements indicated and to drain to the exterior.
2. Locks and Latches: Allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only. Provide limiter installed with tamper resistant screws to prevent window from opening more than 6” (six inches).
3. Roller Assemblies: Low-friction design.

I. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.

J. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.

1. Exposed Fasteners: Do not use exposed fasteners to greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.4 ACCESSORIES

A. Dividers (False Muntins): Provide divider grilles in designs indicated for each sash lite.

1. Quantity and Type: One permanently located between insulating-glass lites.
2. Material: Manufacturer's standard.
3. Pattern: As indicated on Drawings.
4. Profile: Manufacturers widest offering.
5. Color: White.

2.5 INSECT SCREENS

A. General: Fabricate insect screens to integrate with window frame. Provide screen for each operable exterior sash. Screen wickets are not permitted.

1. Type and Location: Full, outside for sliding and Half, outside for single-hung sashes.

B. Aluminum Frames: Manufacturer's standard aluminum alloy complying with SMA 1004 or SMA 1201. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners, and removable PVC spline/anchor concealing edge of frame.

1. Tubular Framing Sections and Cross Braces: Roll formed from aluminum sheet.
2. Finish for Exterior Screens: Baked-on organic coating in color selected by Architect from manufacturer's full range.

C. Glass-Fiber Mesh Fabric: 20-by-20 (0.85-by-0.85-mm) or 20-by-30 (0.85-by-0.42-mm) mesh of PVC-coated, glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration. Comply with ASTM D3656/D3656M.

1. Mesh Color: Black.

2.6 FABRICATION

A. Fabricate vinyl windows in sizes indicated. Include a complete system for installing and anchoring windows.

B. Glaze vinyl windows in the factory.

C. Weather strip each operable sash to provide weathertight installation.

D. Mullions: Provide mullions and cover plates, compatible with window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections. Provide mullions and cover plates capable of withstanding design wind loads of window units. Provide manufacturer's standard finish to match window units.

E. Hardware: Mount hardware through double walls of vinyl extrusions or provide corrosion-resistant reinforcement.

F. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

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.

B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.

C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.

D. 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 E2112.

B. Install windows level, plumb, square, true to line, without distortion, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.

B. Testing Services: Testing and inspecting of installed windows shall take place as follows:

1. Testing Methodology: Testing of windows for air infiltration and water resistance shall be performed according to AAMA 502.
2. Air-Infiltration Testing:

a. Test Pressure: That required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance class indicated.
b. Allowable Air-Leakage Rate: 1.5 times the applicable AAMA/WDMA/CSA 101/I.S.2/A440 rate for product type and performance class rounded down to one decimal place.

3. Water-Resistance Testing:

a. Test Pressure: Two-thirds times test pressure required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance grade indicated.
b. Allowable Water Infiltration: No water penetration.

4. Testing Extent: Three windows of each type as selected by Architect and a qualified independent testing and inspecting agency. Windows shall be tested after perimeter sealants have cured.
5. Test Reports: Prepared according to AAMA 502.

C. Windows will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.4 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.

B. Clean exposed surfaces immediately after installing windows. Remove excess sealants, glazing materials, dirt, and other substances.

1. Keep protective films and coverings in place until final cleaning.

C. Remove and replace sashes if glass has been broken, chipped, cracked, abraded, or damaged during construction period.

D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION 085313

SECTION 087111 - DOOR HARDWARE (DESCRIPTIVE SPECIFICATION)

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Mechanical door hardware for the following:

   a. Swinging doors.
   b. Sliding doors.
   c. Folding doors.

2. Cylinders for door hardware specified in other Sections.
3. Electrified door hardware.

B. Related Sections:

1. Section 064113 "Wood-Veneer-Faced Architectural Cabinets" and Section 064116 "Plastic-Laminate-Faced Architectural Cabinets" for cabinet door hardware provided with cabinets.
2. Section 081113 "Hollow Metal Doors and Frames" for door silencers provided as part of hollow-metal frames.
3. Section 081216 "Aluminum Frames" for door silencers provided as part of aluminum frames.
4. Section 083113 "Access Doors and Frames" for access door hardware, including cylinders.
5. Section 083323 "Overhead Coiling Doors" for door hardware provided as part of overhead door assemblies.
6. Section 084113 "Aluminum-Framed Entrances and Storefronts" for installation of entrance door hardware, except cylinders.
7. Section 084229.23 "Sliding Automatic Entrances" for entrance door hardware, except cylinders.
8. Section 102600 "Wall and Door Protection" for plastic door protection units that match wall protection units.
9. Section 281300 "Access Control" for access control devices installed at door openings and provided as part of a security system.
10. Section 283111 "Digital, Addressable Fire-Alarm System" for connections to building fire-alarm system.
11. Section 283112 "Zoned (DC Loop) Fire-Alarm System" for connections to building fire-alarm system.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Details of electrified door hardware, indicating the following:

1. Wiring Diagrams: For power, signal, and control wiring and including the following:

a. Details of interface of electrified door hardware and building safety and security systems.
b. Schematic diagram of systems that interface with electrified door hardware.
c. Point-to-point wiring.
d. Risers.
e. Elevations doors controlled by electrified door hardware.

2. Operation Narrative: Describe the operation of doors controlled by electrified door hardware.

C. Samples for Initial Selection: For plastic protective trim units in each finish, color, and texture required for each type of trim unit indicated.

D. Samples for Verification: For exposed door hardware of each type required, in each finish specified, prepared on Samples of size indicated below. Tag Samples with full description for coordination with the door hardware schedule. Submit Samples before, or concurrent with, submission of door hardware schedule.

1. Sample Size: Full-size units or minimum 2-by-4-inch (51-by-102-mm) Samples for sheet and 4-inch (102-mm) long Samples for other products.

a. Full-size Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.

E. Other Action Submittals:

1. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

a. Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
b. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
c. Content: Include the following information:

1) Identification number, location, hand, fire rating, size, and material of each door and frame.
2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
3) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.

4) Description of electrified door hardware sequences of operation and interfaces with other building control systems.
5) Fastenings and other pertinent information.
6) Explanation of abbreviations, symbols, and codes contained in schedule.
7) Mounting locations for door hardware.
8) List of related door devices specified in other Sections for each door and frame.

2. Keying Schedule: Prepared by or under the supervision of Installer, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and Architectural Hardware Consultant.

B. Product Certificates: For electrified door hardware, from the manufacturer.

1. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.

C. Product Test Reports: For compliance with accessibility requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.

D. Warranty: Special warranty specified in this Section.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware and keying schedule.

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. Door Hardware: 2 extra of each LH and RH locksets and passage sets from common area Level 1 hardware, 4 extra of each LH and RH locksets and passage sets from residential area Level 2 hardware, 2 closers.
2. Electrical Parts: 1 extra delayed egress relayed crash bar, 1 extra LH and RH resident unit wireless entry door lockset.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and an Architectural Hardware Consultant who is available during the

course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.

1. Warehousing Facilities: In Project's vicinity.
2. Scheduling Responsibility: Preparation of door hardware and keying schedules.
3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as follows:

1. For door hardware, an Architectural Openings Consultant (AOC).

C. Source Limitations: Obtain each type of door hardware from a single manufacturer and all types of hardware under the same umbrella corporation.

1. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

D. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware rated for use in assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C, unless otherwise indicated.

E. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meet requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.

1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at the tested pressure differential of 0.3-inch wg (75 Pa) of water.

F. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

G. Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

H. Accessibility Requirements: Comply with applicable provisions in the DOJ's 2010 ADA Standards for Accessible Design the ABA Standards of the Federal agency having jurisdiction, ICC A117.1, 2010 Florida Fire Prevention Code (FFPC) and 2010 Florida Building Code (FBC) for door hardware on doors in an accessible route.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22.2 N).
2. Comply with the following maximum opening-force requirements:

a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
b. Sliding or Folding Doors: 5 lbf (22.2 N) applied parallel to door at latch.
c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high and 3/4 inch (19 mm) high for exterior sliding doors.
4. Closers: Adjust door and gate closer sweep periods so that, from an open position of 90 degrees, the time required to move the door to a position of 12 degrees from the latch is 5 seconds minimum.
5. Spring Hinges: Adjust door and gate spring hinges so that, from an open position of 70 degrees, the time required to move the door to the closed position is 1.5 seconds minimum.

I. Keying Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." In addition to Owner Contractor, and Architect, conference participants shall also include Installer's Architectural Hardware Consultant and Owner's security 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. Requirements for access control.
5. Address for delivery of keys.

J. Preinstallation 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. Inspect and discuss preparatory work performed by other trades.
3. Inspect and discuss electrical roughing-in for electrified door hardware.
4. Review sequence of operation for each type of electrified door hardware.
5. Review required testing, inspecting, and certifying procedures.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.8 COORDINATION

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete. Concrete, reinforcement, and formwork requirements are specified elsewhere.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

E. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including excessive deflection, cracking, or breakage.
b. Faulty operation of doors and door hardware.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.

a. Electromagnetic and Delayed-Egress Locks: Five years from date of Substantial Completion.
b. Exit Devices: Two years from date of Substantial Completion.
c. Manual Closers: 10 years from date of Substantial Completion.

1.10 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. Provide door hardware for each door as scheduled in Part 3 "Door Hardware Schedule" Article and on Drawings to comply with requirements in this Section.

1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated.
2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.

B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by descriptive titles corresponding to requirements specified in Part 2.

2.2 HINGES

A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Emtek Products, Inc.; an ASSA ABLOY Group company. (inside IL/AL/MC Resident Units only)
b. Hager Companies.
c. Ives; an Allegion brand.
d. Lawrence Hardware Inc.
e. McKinney Products Company; an ASSA ABLOY Group company.
f. Stanley Commercial Hardware; a division of Stanley Security Solutions.

B. Antifriction-Bearing Hinges:

1. Mounting: Full mortise (butts).
2. Bearing Material: Ball bearing.
3. Grade: Grade 1 (heavy weight).
4. Base and Pin Metal:

a. Exterior Hinges: Stainless steel with stainless-steel pin.
b. Interior Hinges: Stainless steel with stainless-steel pin.
c. Hinges for Fire-Rated Assemblies: Stainless steel with stainless-steel pin.

5. Pins: Nonremovable.

6. Tips: Flat button.
7. Corners: Square.

C. Electrified Antifriction-Bearing Hinges: Full-mortise mounting.

1. Bearing Material: Manufacturer's standard antifriction bearing.
2. Grade: Grade 1 (heavy weight).
3. Base and Pin Metal:

    a. Exterior Hinges: Stainless steel with stainless-steel pin.
    b. Interior Hinges: Stainless steel with stainless-steel pin.
    c. Hinges for Fire-Rated Assemblies: Stainless steel with stainless-steel pin.

4. Pins: Nonremovable.

5. Tips: Flat button.
6. Corners: Square.
7. Electric Option: Concealed electric through wires.

D. Plain-Bearing Hinges: Grade 3 (standard weight).

1. Mounting: Full mortise (butts).
2. Base and Pin Metal: Brass with stainless-steel pin body and brass protruding heads.
3. Pins: Non-rising loose unless otherwise indicated.

    a. Outswinging Corridor Doors with Locks: Nonremovable.

4. Tips: Flat button.
5. Corners: Square.

E. Swing-Clear Hinges: Reversible.

1. Mounting: Full mortise (butts).
2. Bearing, and Grade: Antifriction bearing, Grade 1 (heavy weight).
3. Base Metal: Stainless steel.
4. Pins: Nonremovable.

5. Tips: Flat button.
6. Corners: Square.

F. Pocket Hinges: Antifriction bearing; Grade 1 (heavy weight); jamb leaf visible when door is closed and both leaves concealed when door is in pocket; type required for application indicated; cast steel.

G. Double-Acting Pivot-Hinge Set: Grade 2; wrought, forged, or cast steel or malleable iron base metal; consisting of a top pivot and a bottom pivot, each with jamb brackets, and bottom pivot with thrust steel bearing.

2.3 SELF-CLOSING HINGES AND PIVOTS

A. Self-Closing Hinges and Pivots: BHMA A156.17.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Hager Companies.

b. Lawrence Hardware Inc.
c. McKinney Products Company; an ASSA ABLOY Group company.
d. Stanley Commercial Hardware; a division of Stanley Security Solutions.

B. Spring Hinges: Grade 1; wrought steel, with torsion spring.

1. Type: Single acting.
2. Mounting: Full mortise (butts).

C. Horizontal-Spring Pivot Sets: Grade 3; double acting; non-handed; consisting of wrought steel bottom pivot hinge with antifriction bearing and nylon top pivot and socket.

1. Type: Non-hold open.
2. Tension: Adjustable.
3. Bottom Pivot Trim: Steel.
4. Bottom Plate: For bottom hinge attachment to floor.

D. Gate-Spring Pivot Sets: Grade 1; double acting; non-handed; consisting of bottom pivot with door and jamb bracket and top pivot assembly with jamb bracket.

1. Mounting: Mortise.
2. Tension: Adjustable.
3. Base Metal: Cast, forged, or extruded brass or bronze.

E. Gravity Pivot Sets: Grade 3; double acting; surface mounting; non-handed; consisting of bottom pivot with door and jamb bracket and top pivot assembly with jamb bracket.

1. Tension: Adjustable.
2. Base Metal: Wrought brass or bronze.

2.4 CENTER-HUNG AND OFFSET PIVOTS

A. Center-Hung and Offset Pivots: BHMA A156.4.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Hager Companies.
   b. Ives; an Allegion brand.
   c. Rixson Specialty Door Controls; an ASSA ABLOY Group company.
   d. Rockwood; ASSA ABLOY.

B. Center-Hung Pivot Sets: Grade 1.

1. Top Pivots: Walking-beam type with retractable pin and oil-impregnated bronze bearing; mortised into door and frame.
2. Bottom Pivots: Recessed in floor in cement case, and mortised into door; with thrust ball bearing.
3. Base Metal: Brass.

C. Offset Pivot Sets: Grade 1.

1. Offset: 3/4 inch (19 mm).
2. Top Pivot: Full-mortise mounting; walking-beam type with retractable pin and oil-impregnated bronze bearing.

    a. Knuckle: Standard.

3. Bottom Pivot: Recessed in floor in cement case, and mortised into door; with thrust ball bearing.
4. Base Metal: Brass.

D. Offset Intermediate Pivots: Grade 1; for use with offset pivot sets; with oil-impregnated bronze bearings.

1. Mounting: Full mortise, 3/4 inch (19 mm) offset.
2. Knuckle: Standard.
3. Base Metal: Brass.

E. Pocket Pivots: Grade 1; full-mortise mounting; non-handed; allows door to nest in pocket with door surface flush with corridor wall when open; maximum 90-degree swing.

1. Base Metal: Stainless steel.
2. Electric Option: Concealed power transfer in one hinge per door where required for access control.

2.5 MECHANICAL LOCKS AND LATCHES

A. Lock Functions: As indicated in door hardware schedule.

B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

1. Bored Locks: Minimum 1/2-inch (13-mm) latchbolt throw.
2. Mortise Locks: Minimum 3/4-inch (19-mm) latchbolt throw.
3. Deadbolts: Minimum 1-inch (25-mm)bolt throw.

C. Lock Backset: 2-3/4 inches (70 mm), unless otherwise indicated.

D. Lock Trim:

1. Description: Provide at all exterior steel and wood doors.
2. Levers: Cast.

    a. Basis of Design: Yale 5400(LN) series Monroe (MO), Schlage ND Series Athens (ATH).

3. Escutcheons (Roses): Wrought.
4. Dummy Trim: Match lever lock trim and escutcheons.
5. Operating Device: Lever with escutcheons (roses).

E. Lock Trim:

1. Description: Provide at all common interior, back of house areas and within SN Resident Units.
2. Levers: Cast.
    a. Basis of Design: Yale 4700(LN) series Monroe (MO), Schlage ND Series Athens (ATH).
3. Escutcheons (Roses): Wrought.
4. Dummy Trim: Match lever lock trim and escutcheons.
5. Operating Device: Lever with escutcheons (roses).

F. Lock Trim:

1. Description: Provide within all IL/AL/MC Resident Units.
2. Levers: Cast.
    a. Basis of Design: Yale YH Collection Monroe (formerly Meridian), Falcon W Series Avalon.
3. Escutcheons (Roses): Wrought.
4. Dummy Trim: Match lever lock trim and escutcheons.
5. Operating Device: Lever with escutcheons (roses).

G. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.
4. Rabbet Front and Strike: Provide on locksets for rabbeted meeting stiles.

H. Bored Locks: BHMA A156.2; Grade 1 and 2; Series 4000.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Corbin Russwin, Inc.; an ASSA ABLOY Group company.
    b. Falcon; an Allegion Brand. (within resident units only)
    c. SARGENT Manufacturing Company; ASSA ABLOY.
    d. Schlage; an Allegion brand.
    e. Yale Security Inc; an ASSA ABLOY Group company.

I. Mortise Locks: BHMA A156.13; Operational Grade 1; stamped steel case with steel or brass parts; Series 1000.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Corbin Russwin, Inc.; an ASSA ABLOY Group company.
    b. SARGENT Manufacturing Company; ASSA ABLOY.

c. Schlage; an Allegion brand.
d. Yale Security Inc; an ASSA ABLOY Group company.

2.6 AUXILIARY LOCKS

A. Bored Auxiliary Locks: BHMA A156.5: Grade 1; with strike that suits frame.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Arrow USA; an ASSA ABLOY Group company.
b. Best Access Systems; Stanley Security Solutions, Inc.
c. SARGENT Manufacturing Company; ASSA ABLOY.
d. Schlage; an Allegion brand.
e. Yale Security Inc; an ASSA ABLOY Group company.

2. Backset: 2-3/4 inches (70 mm).

3. Material: Stainless steel.
4. Deadlatches: Deadlocking latchbolt operated by key outside and turn inside.
5. Deadlocks: Deadbolt operated by key either side.

B. Mortise Auxiliary Locks: BHMA A156.5; Grade 1; with strike that suits frame.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. SARGENT Manufacturing Company; ASSA ABLOY.
b. Schlage; an Allegion brand.
c. Yale Security Inc; an ASSA ABLOY Group company.

2. Backset: 2-3/4 inches (70 mm).

3. Material: Stainless steel.
4. Deadlocks: Deadbolt operated by key either side.
5. Deadlatches: Latchbolt and auxiliary deadlatch operated by key outside and turn inside.
6. Deadlocks for Sliding Doors: Expanding- or interlocking-type deadbolt operated by key outside and turn inside.
7. Deadlatches for Sliding Doors: Hook-type latchbolt operated by key outside and handle inside.

C. Push-Button Combination Locks: ANSI/BHMA A156.36, cylindrical, Grade 1; lock opens by entering a one- to five-digit code by pushing correct buttons in correct sequence; automatically relocks when door is closed; with strike that suits frame.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. dormakaba Group, Simplex.

2. Auxiliary Lock Configuration: Deadlocking latch.

3. Override: By key cylinder.

2.7 ELECTRIC STRIKES

A. Electric Strikes: BHMA A156.31; Grade 1; with faceplate to suit lock and frame.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Adams Rite Manufacturing Co; an ASSA ABLOY Group company.
b. Dortronics Systems, Inc.
c. DynaLock Corp.
d. Security Door Controls.

2. Material: Stainless steel.

3. Mounting: Mortised.
4. Fire-Rated Door Assemblies: Use fail-secure electric strikes with fire-rated devices.
5. Monitoring: Mechanical strike.
6. Options: Lip extension kit.

2.8 ELECTROMAGNETIC LOCKS

A. Electromagnetic Locks: BHMA A156.23; electrically powered; with electromagnet attached to frame and armature plate attached to door; full-exterior or full-interior type, as required by application indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. DynaLock Corp.
b. Schlage; an Allegion brand.
c. Securitron Magnalock Corporation; an ASSA ABLOY Group company.

2. Direct-Hold Type: Lock mounted on face of header; strike angle mounted on door pull side.
3. Strength Ranking: 1200 lbf (5338 N).
4. Inductive Kickback Peak Voltage: Not more than 53 V.
5. Residual Magnetism: Not more than 4 lbf (18 N) to separate door from magnet.
6. Options:

a. Magnetic bond sensor.
b. Double LED indicators.
c. Adjustable time delay with automatic relock.
d. Integral door position switch.

B. Delayed-Egress Electromagnetic Locks: BHMA A156.24, electrically powered, with electromagnet attached to frame and armature plate attached to door; depressing push bar for more than 3 seconds initiates irreversible alarm and 15-second delay for egress. When integrated with fire alarm, fire alarm voids 15-second delay.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. DynaLock Corp.
    b. Schlage; an Allegion brand.
    c. Securitron Magnalock Corporation; an ASSA ABLOY Group company.

2. Grade: Security Grade, activated from secure side of door by initiating device.

2.9 ELECTROMECHANICAL LOCKS

A. Electromechanical Locks: BHMA A156.25; Grade 1; motor or solenoid driven; mortise deadlocking latchbolt; with strike that suits frame with proper lip length to protect trim but not project more than 1/8" beyond trim, frame or inactive leaf.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. SARGENT Manufacturing Company; ASSA ABLOY.
    b. Schlage; an Allegion brand.
    c. Yale Security Inc; an ASSA ABLOY Group company.

2.10 SELF-CONTAINED ELECTRONIC LOCKS

A. Self-Contained Electronic Locks: BHMA A156.25, bored; with internal, battery-powered, self-contained electronic locks; consisting of complete lockset, motor-driven lock mechanism, and actuating device; enclosed in zinc-dichromate-plated, wrought-steel case, and strike that suits frame. Provide key override, low-battery detection and warning, LED status indicators, and ability to program at the lock.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. SARGENT Manufacturing Company; ASSA ABLOY.
    b. Schlage; an Allegion brand.
    c. Yale Security Inc; an ASSA ABLOY Group company.

2. Actuating Device: Digital keypad.

3. Basis of Design: nexTouch Cylindrical Keypad Lock, Schlage AD-200

4. Faceplate Material: Stainless steel.
5. Trim: Match trim specified for mechanical locks.
6. Function: Latch with key.

2.11 EXIT LOCKS AND EXIT ALARMS

A. Exit Locks and Alarms: BHMA A156.29, Grade 1.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Corbin Russwin: an ASSA ABLOY Group company.
b. SARGENT Manufacturing Company; ASSA ABLOY.
c. Yale Hardware; ASSA ABLOY.

B. Exit Locks: Surface mounted; battery powered, housed in metal case; with manufacturer's standard strike that suits frame; with red-and-white lettering reading "EMERGENCY EXIT PUSH TO OPEN--ALARM WILL SOUND."

1. Single-Door Type: Activated by arm, push plate, or paddle.
2. Options:

a. Low-battery alert.
b. Outside key control.
c. Audible alarm that sounds when unauthorized use of door occurs.
d. Silent alarm with remote signal capability for connection to remote indicating panel.
e. Strike: Mortise.

C. Stand-Alone Exit Alarms: Surface mounted on door.

1. Basis of Design: Yale SDA16-1

2. Options:

a. Low-battery alert.
b. Outside key control.
c. Audible alarm that sounds when unauthorized use of door occurs.
d. Automatic rearming after authorized use, with adjustable time delay.
e. Remote signal capability for connection to remote indicating panel.

2.12 SURFACE BOLTS

A. Not accepted.

2.13 MANUAL FLUSH BOLTS

A. Manual Flush Bolts: BHMA A156.16; minimum 3/4-inch (19-mm) throw; designed for mortising into door edge.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Adams Rite Manufacturing Co; an ASSA ABLOY Group company.
b. Hager Companies.
c. Ives; an Allegion brand.
d. Rockwood; ASSA ABLOY.
e. Trimco.

B. Manual-Extension Flush Bolts: Grade 1, fabricated from extruded brass or aluminum, with 12-inch (305-mm) rod actuated by flat lever; listed and labeled for fire-rated doors. Provide with matching dustproof strike.

C. Dustproof Strikes: Locking type, Grade 1, polished wrought brass, with 3/4-inch- (19-mm-) diameter, spring-tension plunger.

2.14 EXIT DEVICES AND AUXILIARY ITEMS

A. Exit Devices and Auxiliary Items: BHMA A156.3.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Adams Rite Manufacturing Co; an ASSA ABLOY Group company.
    b. Corbin Russwin, Inc.; an ASSA ABLOY Group company.
    c. Falcon; an Allegion Brand.
    d. Precision Hardware, Inc.; a Stanley company.
    e. SARGENT Manufacturing Company; ASSA ABLOY.
    f. Von Duprin; an Allegion brand.
    g. Yale Security Inc; an ASSA ABLOY Group company.

B. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

C. Fire Exit Devices: Devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252.

D. Rim Exit Devices: Grade 1.

1. Type: Type 1, rim.
2. Grade: Grade 1.
3. Actuating Bar: Push pad.
4. Material: Stainless steel.
5. Electrified Options:

    a. Pushpad monitor switch.
    b. Double-pushpad monitor switch.
    c. Electric locking and unlocking.
    d. Delayed egress.
    e. Alarm.
6. Basis of Design: Yale 7000/7000F Series, Falcon 25/F25 Series.

E. Concealed Vertical-Rod Exit Devices: Grade 1.

1. Type: Type 7, for wood doors and Type 8, for metal doors.
2. Grade: Grade 1.
3. Actuating Bar: Push pad.
4. Material: Stainless steel or Aluminum.

5. Electrified Options:

    a. Pushpad monitor switch.
    b. Double-pushpad monitor switch.
    c. Electric locking and unlocking.
    d. Delayed egress.
    e. Alarm.
6. Basis of Design: Yale 7000/7000F Series, Falcon 25C/F25C Series.

F. Combination Exit Devices: Grade 1.

1. Type: Type 12, mortise and concealed vertical rod.
2. Grade: Grade 1.
3. Actuating Bar: Push pad at standard doors and Narrow-stile push pad at storefront doors.
4. Material: Stainless steel or Aluminum.
5. Electrified Options:

    a. Pushpad monitor switch.
    b. Double-pushpad monitor switch.
    c. Electric locking and unlocking.
    d. Delayed egress.
    e. Alarm.
6. Basis of Design: Yale 7000/7000F Series, Falcon 25/F25 Series.

G. Automatic Latching Two-Point Bolts: Grade 1.

1. Type: Type 23, concealed.
2. Material: Stainless steel.

H. Extension Flush Bolt Sets: BHMA A156.3; Grade 1.

1. Type: Type 25, automatic.
2. Material: Stainless steel.

I. Electronic Exit Bars: Nonlatching electronic actuating (releasing) device activated by an adjustable capacitance sensor and with no moving parts; listed and labeled as panic exit hardware. Fabricate bar from extruded aluminum, and provide door and frame transfer device and 16 feet (4.9 m) of cord to route wiring off the door frame.

J. Exit Device Outside Trim: Lever with cylinder; material and finish to match locksets, unless otherwise indicated.

1. Match design for lock trim, unless otherwise indicated.

K. Through-Bolt Fasteners: For exit devices and trim on metal doors.

2.15 LOCK CYLINDERS

A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Best Access Systems; Stanley Security Solutions, Inc.
    b. Corbin Russwin, Inc.; an ASSA ABLOY Group company.
    c. SARGENT Manufacturing Company; ASSA ABLOY.
    d. Schlage; an Allegion brand.
    e. Yale Security Inc; an ASSA ABLOY Group company.

B. Standard Lock Cylinders: BHMA A156.5; Grade 1; permanent cores that are interchangeable; face finished to match lockset.

1. Number of Pins: Six.
2. Type: Mortise, Rim or Bored-lock type.

C. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.

D. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

2.16 KEYING

A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference.
1. Grand Master Key System: Change keys, a master key, and a grand master key operate cylinders.
2. Existing System:

    a. Master key or grand master key locks to Owner's existing system.

3. Keyed Alike: Key all cylinders to same change key.

B. Keys: Brass.

1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:

    a. Notation: "DO NOT DUPLICATE."

2. Quantity: In addition to one extra key blank for each lock, provide the following:

    a. Cylinder Change Keys: Three.
    b. Master Keys: Five.
    c. Grand Master Keys: Five.

2.17 KEY CONTROL SYSTEM

A. Key Control Cabinet: BHMA A156.5; metal cabinet with baked-enamel finish; containing key-holding hooks, labels, 2 sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers; with key capacity of 150 percent of the number of locks.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Key Boxes and Cabinets.
b. GE Security, Inc.
c. Lund Equipment Co., Inc.
d. MMF Industries.

2. Wall-Mounted Cabinet: Cabinet with hinged-panel door equipped with key-holding panels and pin-tumbler cylinder door lock.

B. Key Lock Boxes: Designed for storage of 5 keys, with tamper switches to connect to intrusion detection system.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. GE Security, Inc.
b. Knox Company.

C. Cross-Index System: Multiple-index system for recording key information. Include three receipt forms for each key-holding hook. Set up by key control manufacturer.

D. Key Control System Software: BHMA A156.5, Grade 1; multiple-index system for recording and reporting key-holder listings, tracking keys and lock and key history, and printing receipts for transactions. Include instruction manual.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Best Access Systems; Stanley Security Solutions, Inc.
b. GE Security, Inc.
c. HPC, Inc.

2.18 OPERATING TRIM

A. Operating Trim: BHMA A156.6; stainless steel, unless otherwise indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Hager Companies.
b. Ives; an Allegion brand.
c. Rockwood Manufacturing Company; an ASSA ABLOY Group company.
d. Trimco.

B. Flat Push Plates: 0.050 inch (1.3 mm) thick, 6 inches wide by 16 inches high (153 mm wide by 406 mm high) at stile & rail doors and 8 inches wide by 16 inches high (203 mm wide by 406 mm high) at flush doors with square corners and beveled edges; secured with exposed screws.

C. Push-Pull Plates: 1/8 inch (3.2 mm) thick, 3-1/2 inches wide by 15-3/4 inches high (89 mm wide by 400 mm high) with square corners, beveled edges, and raised integral lip; secured with exposed screws.

D. Straight Door Pulls: With minimum clearance of 1-1/2 inches (38 mm) from face of door.

1. Type: 3/4-inch (19-mm) constant-diameter pull.
2. Mounting: Back to back with threaded sleeves.
3. Overall Length: 9 inches (229 mm).

E. Offset Door Pulls: 1-inch (25-mm) constant-diameter pull with minimum clearance of 2-1/4 inches (57 mm) from face of door and offset of 2 inches (51 mm).

1. Mounting: Through bolted with oval-head machine screws and countersunk washers.
2. Overall Length: 9 inches (229 mm).

F. Flush Door Pulls: Mortised 1/2 inch (13 mm) deep; secured with screws.

1. Shape: Rectangular with rectangular recess.
2. Size: 3-1/2 inches wide by 4-3/4 inches high (89 mm wide by 121 mm high).

G. Straight Pull-Plate Door Pulls: 0.050-inch- (1.3-mm-) thick plate, 4 inches wide by 16 inches high (102 mm wide by 406 mm high) with square corners and beveled edges; pull with minimum clearance of 1-1/2 inches (38 mm) from face of door.

1. Type: 3/4-inch (19-mm) constant-diameter pull.
2. Mounting: Surface applied with concealed fasteners.
3. Overall Pull Length: 9 inches (229 mm).

2.19 ACCESSORIES FOR PAIRS OF DOORS

A. Coordinators: BHMA A156.3; consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release; and with internal override.

B. Carry-Open Bars: BHMA A156.3; prevent the inactive leaf from opening before the active leaf; provide polished brass or bronze carry-open bars with strike plate for inactive leaves of pairs of doors unless automatic or self-latching bolts are used.

C. Flat Overlapping Astragals: BHMA A156.22; flat stainless steel metal bar, surface mounted on face of door with screws; minimum 1/8 inch (3.2 mm) thick by 2 inches (51 mm) wide by full height of door.

2.20 SURFACE CLOSERS

A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Corbin Russwin, Inc.; an ASSA ABLOY Group company.
b. Falcon; an Allegion Brand.
c. LCN; an Allegion brand.
d. SARGENT Manufacturing Company; ASSA ABLOY.
e. Yale Security Inc; an ASSA ABLOY Group company.

B. Surface Closer with Cover: Grade 1; Modern Type with mechanism enclosed in cover.

1. Mounting: Parallel arm.
2. Type: Regular arm.
3. Backcheck: Adjustable, effective between 60 and 85 degrees of door opening.
4. Cover Material: Molded plastic.
5. Closing Power Adjustment: At least 50 percent more than minimum tested value.
6. Basis of Design: Yale 3000, Falcon SC70A.

2.21 CLOSER HOLDER RELEASE DEVICES

A. Closer Holder Release Devices: BHMA A156.15; Grade 1; closer connected with separate or integral releasing and fire- or smoke-detecting devices. Door shall become self-closing on interruption of signal to release device. Automatic release is activated by smoke detection system.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Corbin Russwin, Inc.; an ASSA ABLOY Group company.
b. LCN; an Allegion brand.
c. Rixson Specialty Door Controls; an ASSA ABLOY Group company.
d. SARGENT Manufacturing Company; ASSA ABLOY.

2. Type: Single-point hold open.

3. Mounting: Surface mounted on face of door.
4. Options: Adjustable backcheck Adjustable spring power.
5. Basis of Design: Yale 3000, Falcon SC70A.

2.22 MECHANICAL STOPS AND HOLDERS

A. Wall- and Floor-Mounted Stops: BHMA A156.16; polished cast brass, bronze, or aluminum base metal.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Hager Companies.
b. Ives; an Allegion brand.
c. Rockwood Manufacturing Company; an ASSA ABLOY Group company.
d. Trimco.

B. Rigid-Type Floor Stop: Grade 1; with rubber bumper; for surface-screw application.

C. Dome-Type Floor Stop: Grade 1; with minimum 1-inch- (25-mm-) high bumper for doors without threshold and 1-3/8-inch- (35-mm-) high bumper for doors with threshold; provide with extruded aluminum riser for carpet installations.

D. Combination Floor Stop and Holder: Grade 1; for surface-screw application; with semiautomatic hold open.

E. Manual Combination Floor Stop and Holder: Grade 1; 3-1/2 inches (89 mm) long, with holder, keeper, and rubber bumper; for surface-screw application.

F. Chain Door Stops: Grade 2; welded chain, each end attached to compression springs, both covered with protective sleeve; for surface-screw application.

G. Wall Bumpers: Grade 1; with rubber bumper; 2-1/2-inch (64-mm) diameter, minimum 3/4-inch (19-mm) projection from wall; with backplate for concealed fastener installation; with convex bumper configuration.

H. Roller-Type Wall Bumpers: Grade 2; minimum 4-3/8-inch (111-mm) projection from wall; for surface-screw application.

I. Lever-Type Door Holders: Grade 1; minimum 4-inch- (102-mm-) long arm that swings up and remains in vertical position; with replaceable rubber tip; for surface-screw application.

2.23 ELECTROMAGNETIC STOPS AND HOLDERS

A. Electromagnetic Door Holders: BHMA A156.15, Grade 1; wall-mounted electromagnetic single unit with strike plate attached to swinging door; coordinated with fire detectors and interface with fire alarm system for labeled fire-rated door assemblies.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. DORMA Architectural Hardware; a division of DORMA Group North America.
b. RIXSON; ASSA ABLOY.
c. SARGENT Manufacturing Company; ASSA ABLOY.

2.24 OVERHEAD STOPS AND HOLDERS

A. Overhead Stops and Holders: BHMA A156.8.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. RIXSON; ASSA ABLOY.
b. Rockwood Manufacturing Company; an ASSA ABLOY Group company.
c. SARGENT Manufacturing Company; ASSA ABLOY.

B. Overhead Surface-Mounted Slide Holders: Type 2; Grade 1; hold open and release by push and pull of door unless control is set in inactive position; with stop, shock absorber, and adjustable holding pressure; for single-acting doors opening 110 degrees.

C. Overhead Surface-Mounted, Concealed Slide Stops: Type 2; Grade 1; release by push and pull of door unless control is set in inactive position; with stop, shock absorber, and adjustable holding pressure; for single-acting doors opening 110 degrees.

2.25 DOOR GASKETING

A. Door Gasketing: BHMA A156.22; air leakage not to exceed 0.50 cfm per foot (0.000774 cu. m/s per m) of crack length for gasketing other than for smoke control, as tested according to ASTM E 283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. National Guard Products, Inc.
b. Pemko Manufacturing Co.
c. Reese Enterprises, Inc.
d. Zero International, Inc.

B. Adhesive-Backed Perimeter Gasketing: Sponge silicone, Silicone, Neoprene bulb or Sponge neoprene gasket material applied to frame rabbet with self-adhesive.

C. Overlapping Astragals for Meeting Stiles: EPDM strip gasket material held in place by aluminum housing and overlapping when doors are closed; mounted to face of meeting stile with screws; surface mounted to each door.

D. Door Sweeps: Vinyl gasket material held in place by flat aluminum housing or flange; surface mounted to face of door with screws.

E. Automatic Door Bottoms: Sponge neoprene, Sponge silicone, Thermoplastic elastomer or Nylon brush gasket material held in place by aluminum housing that automatically drops to form seal when door is closed; mounted to bottom edge of door with screws.

1. Mounting: Mortised into bottom of door.
2. Type: Low-closing-force type for doors required to meet accessibility requirements.

2.26 THRESHOLDS

A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Hager Companies.
b. Pemko Manufacturing Co.
c. Reese Enterprises, Inc.
d. Rixson Specialty Door Controls; an ASSA ABLOY Group company.
e. Zero International, Inc.

B. Compressing-Top Thresholds: Metal member with compressible vinyl seal on top of threshold that seals against bottom of door; and base metal of aluminum.

C. Saddle Thresholds:

1. Type: Fluted top.
2. Base Metal: Aluminum.

D. Half-Saddle Thresholds: Fluted-top metal member; and base metal of aluminum.

E. Latching/Rabbeted Thresholds:

1. Type: Fluted top.
2. Base Metal: Aluminum.

F. Latching/Rabbeted Thresholds with Gasket: Fluted-top metal member with gasket.

1. Type: Offset.
2. Base Metal: Aluminum.
3. Gasket Material: Silicone, Neoprene, Brush pile or Closed-cell sponge neoprene.

G. Plate Thresholds: Solid metal plate.

1. Top Surface: Fluted with slip-resistant abrasive.
2. Base Metal: Aluminum.

H. Ramped Thresholds: Modular, interlocking, sloped, fluted-top metal assemblies with closed return ends; 1:12 slope.

1. Top Surface: Fluted with slip-resistant abrasive.
2. Base Metal: Aluminum.

2.27 SLIDING DOOR HARDWARE

A. Sliding Door Hardware: BHMA A156.14; consisting of complete sets including rails, hangers, supports, bumpers, floor guides, and accessories indicated.

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. Hager Companies.
    b. Stanley Commercial Hardware; a division of Stanley Security Solutions.

B. Bypassing Sliding Door Hardware: Rails and door hardware that allow vertical adjustment and rated for doors weighing up to 80 lb (36 kg) Grade 1.

1. Rail Material: Extruded aluminum.
2. Rail Configuration: V-grooved double leg.
3. Mounting: Top hung.
4. Wheel Assembly: Two wheel or four wheel, with roller bearings.
5. Pulls: Flush, mortised into door typical and Cast, forged, or extruded stainless steel surface-applied D-handle type at ADA units.
6. Accessories:

    a. Bumper stops; wrought steel.
    b. Floor guides.

C. Pocket Sliding Door Hardware: Grade 1; rated for doors weighing up to 80 lb (36 kg), overhead box rails and door hardware that allows vertical adjustment.

1. Rail Material: Extruded aluminum.
2. Door Type: Single.
3. Rail Configuration: V-grooved double leg.
4. Wheel Assembly: Two wheel or four wheel, roller bearings.
5. Pulls: Cast, forged, or extruded stainless steel surface-applied D-handle type at ADA bathrooms and Sliding door privacy latch at all remaining locations.
6. Accessories:

    a. Bumper stops; wrought steel.
    b. Floor guides installed within pocket.
    c. Door stops on ADA pockets holding door to 32 inch opening.

2.28 FOLDING DOOR HARDWARE

A. General: BHMA A156.14; complete sets including overhead rails, hangers, supports, bumpers, floor guides, and accessories indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Hager Companies.
    b. Stanley Commercial Hardware; a division of Stanley Security Solutions.

B. Bifolding Door Hardware: Rated for door panels weighing up to 30 lb (14 kg) Grade 2; with rails and door hardware that allow horizontal and vertical adjustment.

1. Rail Material: Extruded aluminum.
2. Rail Configuration: V-grooved double leg.
3. Mounting: Surface mounted overhead.
4. Wheel Assembly: Two wheel or four wheel, with roller bearings.

2.29 METAL PROTECTIVE TRIM UNITS

A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch- (1.3-mm-) thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. InPro Corporation (IPC).
b. Ives; an Allegion brand.
c. Rockwood Manufacturing Company; an ASSA ABLOY Group company.
d. Trimco.

B. Armor Plates: 42 inches (1067 mm) high by door width with allowance for frame stops.

C. Kick Plates: 10 inches (254 mm) high by door width with allowance for frame stops.

D. Mop Plates: 6 inches (152 mm) high by 1 inch (25 mm) less than door width.

E. Nonmortise Angle Door Edging: 42-inch- (1067-mm-) high by minimum 0.050-inch- (1.3-mm-) thick metal sheet formed into angle shape; with 1-1/4-inch (32-mm) length of leg on face of door; for surface mounting on door.

1. Leg Offset: To accommodate door protection plate of type indicated.

F. Mortise Angle Door Edging: 42-inch- (1067-mm-) high by minimum 0.050-inch- (1.3-mm-) thick metal sheet formed into angle shape; with 7/8-inch (22-mm) length of leg on face of door; for mortise application into edge of door.

G. Nonmortise Cap Door Edging: 42-inch- (1067-mm-) high by minimum 0.050-inch- (1.3-mm-) thick metal sheet formed into "U" shape; with 1-1/4-inch (32-mm) length of leg on faces of door; for surface mounting on door.

1. Leg Offset: To accommodate door protection plate of type indicated.

H. Mortise Cap Door Edging: 42-inch- (1067-mm-) high by minimum 0.050-inch- (1.3-mm-) thick metal sheet formed into "U" shape; with 7/8-inch (22-mm) length of leg on faces of door; for mortise application into edge of door.

2.30 AUXILIARY DOOR HARDWARE

A. Auxiliary Hardware: BHMA A156.16.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Hager Companies.
b. Rockwood Manufacturing Company; an ASSA ABLOY Group company.
c. Stanley Commercial Hardware; a division of Stanley Security Solutions.
d. Trimco.

B. Wide-Angle Door Viewers: Grade 2; solid brass with optical glass lenses; adjustable to door thickness and permitting 1-way observation with minimum 190-degree viewing angle.

C. Fire-Rated Door Viewers: Solid brass with optical glass lenses; listed and labeled for use in fire-rated door assemblies; adjustable to door thickness, and permitting 1-way observation with minimum 150-degree viewing angle.

D. Silencers for Wood Door Frames: Grade 1; neoprene or rubber; minimum 5/8 by 3/4 inch (16 by 19 mm); fabricated for drilled-in application to frame.

E. Silencers for Metal Door Frames: Grade 1; neoprene or rubber; minimum diameter 1/2 inch (13 mm); fabricated for drilled-in application to frame.

2.31 AUXILIARY ELECTRIFIED DOOR HARDWARE

A. Auxiliary Electrified Door Hardware:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. DynaLock Corp.
b. SARGENT Manufacturing Company; ASSA ABLOY.
c. Schlage; an Allegion brand.
d. Yale Hardware; ASSA ABLOY.

B. Boxed Power Supplies: Modular unit in NEMA ICS 6, Type 4 enclosure; filtered and regulated; voltage rating and type matching requirements of door hardware served; listed and labeled for use with fire alarm systems.

C. Door Position Switches: Magnetically operated reed switch designed for concealed mounting.

D. Door and Frame Transfer Devices: Steel housing for mortise in hinge stile of door, with flexible tube for wiring bundle; accommodating doors that swing open to 120 degrees.

2.32 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and

hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.

C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
2. Fire-Rated Applications:

    a. Wood or Machine Screws: For the following:

        1) Hinges mortised to doors or frames; use threaded-to-the-head wood screws for wood doors and frames.
        2) Strike plates to frames.
        3) Closers to doors and frames.

    b. Steel Through Bolts: For the following unless door blocking is provided:

        1) Surface hinges to doors.
        2) Closers to doors and frames.
        3) Surface-mounted exit devices.

3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
4. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."
5. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.33 FINISHES

A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.

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.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

B. Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."

3.3 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Custom Steel Doors and Frames: HMMA 831.
3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

D. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule but not fewer than one intermediate offset

pivot per door and one additional intermediate offset pivot for every 30 inches (750 mm) of door height greater than 90 inches (2286 mm).

E. Lock Cylinders: Install construction cores to secure building and areas during construction period.

1. Replace construction cores with permanent cores as indicated in keying schedule.

F. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

G. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Architect.

1. Configuration: Provide least number of power supplies required to adequately serve doors with electrified door hardware. For AL/MC Facilities provide a minimum of one (1) for AL and one (1) for MC to allow separate alarming for door release.

H. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."

I. Stops: Provide wall stops for doors unless floor or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.

J. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

K. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

L. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
3. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

B. Occupancy Adjustment: Approximately six months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.5 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Section 017900 "Demonstration and Training."

3.7 DOOR HARDWARE SCHEDULE

A. See sheets A9.1 and A9.2 for hardware sets and schedule.

END OF SECTION 087111

SECTION 087113 - AUTOMATIC DOOR OPERATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Power door operators for swinging doors.
2. Low-energy door operators for swinging doors.
3. Power-assist door operators for swinging doors.
4. Guide rails.

1.3 DEFINITIONS

A. AAADM: American Association of Automatic Door Manufacturers.

B. Activation Device: A control that, when actuated, sends an electrical signal to the door operator to open the door.

C. Safety Device: A control that, to avoid injury, prevents a door from opening or closing.

D. For automatic door terminology, see BHMA A156.19 for definitions of terms.

1.4 COORDINATION

A. Templates: Distribute for doors, frames, and other work specified to be factory prepared and reinforced for installing automatic door operators.

B. Coordinate hardware for doors with operators to ensure proper size, thickness, hand, function, and finish.

C. Electrical System Roughing-in: Coordinate layout and installation of automatic door operators with connections to power supplies and access-control system.

D. Pneumatic System Roughing-in: Coordinate layout and installation of automatic door operators and power units with compressed-air piping.

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 for automatic door operators.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For automatic door operators.

1. Include plans, elevations, sections, hardware mounting heights, and attachment details.
2. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Indicate locations of activation and safety devices.
4. Include diagrams for power, signal, and control wiring.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of automatic door operator. For each operator for fire-rated door assemblies, certify that operator is listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for use on types and sizes of labeled fire doors required.

C. Sample Warranties: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For automatic door operators, safety devices, and control systems, to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer for installation and maintenance of units required for this Project.

B. Certified Inspector Qualifications: Certified by AAADM.

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of automatic door operators that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Faulty or sporadic operation of automatic door operator, including controls.

b. Deterioration of metals, metal finishes, and other materials beyond normal weathering or use.

2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Besam Entrance Solutions; ASSA ABLOY.
2. Falcon; an Allegion Brand.
3. LCN; an Allegion brand.
4. Norton; ASSA ABLOY.
5. Stanley Access Technologies.

B. Source Limitations: Obtain automatic door operators, including activation and safety devices, from same manufacturer as for hardware in Section 087111 "Door Hardware (Descriptive Specification)."

2.2 AUTOMATIC DOOR OPERATORS, GENERAL

A. General: Provide operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for occupancy type indicated; and according to UL 325. Coordinate operator mechanisms with door operation, hinges, and activation and safety devices.
1. Fire-Rated Doors: Provide door operators for fire-rated door assemblies that comply with NFPA 80 for fire-rated door components and are listed and labeled by a qualified testing agency.
2. Wind Load: Provide door operators on exterior doors that will open and close doors and maintain them in fully closed position when subjected to wind load as indicated on the Structural Drawings.

B. Electrohydraulic Operating System: Self-contained, low-pressure unit; with separate cylinders for power and checking, connections for power and activation- and safety-device wiring, and manual operation including spring closing when power is off.

C. Hinges: See Section 087111 "Door Hardware (Descriptive Specification)" for hinge type for each door that door operator shall accommodate.

D. Cover for Surface-Mounted Operators: Fabricated from 0.125-inch- (3.2-mm-) thick, extruded or formed aluminum; manufacturer's standard width; with enclosed end caps, provision for maintenance access, and fasteners concealed when door is in closed position.

E. Brackets and Reinforcements: Fabricated from aluminum with nonstaining, nonferrous shims for aligning system components.

F. Fire-Door Package: Consisting of UL-listed latch mechanism, power-reset box, and caution signage for fire-rated doors. Latch mechanism shall allow door to swing free during automatic operation; when fire is detected, latch actuator shall cause exit hardware to latch when door closes. Provide latch actuators with fail-secure design.

G. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 LOW-ENERGY DOOR OPERATORS

A. Standard: BHMA A156.19.

B. Performance Requirements:

1. Opening Force if Power Fails: Not more than 15 lbf (67 N) required to release latch if provided, not more than 30 lbf (133 N) required to manually set door in motion, and not more than 15 lbf (67 N) required to fully open door.
2. Entrapment-Prevention Force: Not more than 15 lbf (67 N) required to prevent stopped door from closing or opening.

C. Configuration: Operator to control single swinging door.

1. Traffic Pattern: Two way.
2. Operator Mounting: Surface.

D. Operation: Power opening and spring closing. Provide time delay for door to remain open before initiating closing cycle as required by BHMA A156.19. When not in automatic mode, door operator shall function as manual door closer, with or without electrical power.

E. Operating System: Electrohydraulic.

F. Microprocessor Control Unit: Solid-state controller.

G. Features:

1. Adjustable opening and closing speed.
2. Adjustable opening and closing force.
3. Adjustable backcheck.
4. Adjustable hold-open time from zero to 30 seconds.
5. Adjustable time delay.
6. Adjustable acceleration.
7. Obstruction recycle.
8. On-off/hold-open switch to control electric power to operator; key operated.

H. Activation Device: Push-plate switch on each side of door to activate door operator.

I. Exposed Finish: Finish matching door and frame.

1. Color: As selected by Architect from full range of industry colors and color densities.

2.4 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Extrusions: ASTM B 221 (ASTM B 221M).
2. Sheet: ASTM B 209 (ASTM B 209M).

B. Expanded Aluminum Mesh: Expanded and flattened aluminum sheet according to the geometry of ASTM F 1267.

C. Polycarbonate Sheet: ASTM C 1349, Appendix X1, Type II, coated, mar-resistant, UV-stabilized polycarbonate with coating on both surfaces.

D. Fasteners and Accessories: Corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

2.5 CONTROLS

A. General: Provide controls, including activation and safety devices, according to BHMA standards; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for occupancy type indicated. Coordinate activation and safety devices with door operation and door operator mechanisms.

B. Motion Sensors: Self-contained, K-band-frequency, microwave-scanner units; fully enclosed in plastic housing; adjustable to provide detection field sizes and functions required by BHMA A156.10.

1. Provide capability for switching between bidirectional and unidirectional detection.
2. For one-way traffic, sensor on egress side shall not be active when doors are fully closed.

C. Presence Sensors: Self-contained, active-infrared scanner units; adjustable to provide detection field sizes and functions required by BHMA A156.10. Sensors shall remain active at all times.

D. Photoelectric Beams: Pulsed infrared, sender-receiver assembly for recessed mounting. Beams shall not be active when doors are fully closed.

E. Push-Plate Switch: Momentary-contact door control switch with flat push-plate actuator with contrasting-colored, engraved message.

1. Configuration: Rectangular push plate with 2-by-4-inch (50-by-100-mm) junction box.

a. Mounting: Recess mounted, semiflush in wall.

2. Push-Plate Material: Stainless steel as selected by Architect from manufacturer's full range.
3. Message: International symbol of accessibility and "Push to Open."

F. Key Switch: Recess-mounted, door control switch with key-controlled actuator; enclosed in 2-by-4-inch (50-by-100-mm) junction box. Provide faceplate engraved with text indicating switch functions.

1. Faceplate Material: Stainless steel.
2. Functions: Two-way automatic, hold open, one-way exit, and off.
3. Mounting: Recess mounted, semiflush in wall.

G. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.

2.6 FABRICATION

A. Factory fabricate automatic door operators to comply with indicated standards.

B. Form aluminum shapes before finishing.

C. Fabricate exterior components to drain condensation and water passing joints within operator enclosure to the exterior.

D. Use concealed fasteners to greatest extent possible. Where exposed fasteners are required, use countersunk Phillips flat-head machine screws, finished to match operator.

E. Provide metal cladding, completely covering visible surfaces before shipment to Project site. Fabricate cladding with concealed fasteners and connection devices, with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion, and with allowance for thermal expansion at exterior doors.

2.7 ACCESSORIES

A. Signage: As required by cited BHMA standard for type of door and its operation.

1. Application Process: Decals.
2. Provide sign materials with instructions for field application when operators are installed.

2.8 GENERAL FINISH REQUIREMENTS

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

B. Apply organic and anodic finishes to formed metal after fabrication unless otherwise indicated.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within range of approved Samples and are assembled or installed to minimize contrast.

2.9 ALUMINUM FINISHES

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, door and frame preparation and reinforcements, and other conditions affecting performance of automatic door operators.

B. Examine roughing-in for electrical systems to verify actual locations of power connections before automatic door operator installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install automatic door operators according to manufacturer's written instructions and cited BHMA standard for type of door operation and direction of pedestrian travel, including signage, controls, wiring, remote power units if any, and connection to building's power supply.

1. Do not install damaged components. Fit joints to produce hairline joints free of burrs and distortion.
2. Install operators true in alignment with established lines and door geometry without warp or rack. Anchor securely in place.

B. Controls: Install activation and safety devices according to manufacturer's written instructions and cited BHMA standard for operator type and direction of pedestrian travel. Connect control wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

C. Access-Control System: Connect operators to access-control system as specified in Section 281300 "Access Control."

D. Signage: Apply on both sides of each door as required by cited BHMA standard for type of door operator and direction of pedestrian travel.

E. Guide Rails: Install according to BHMA A156.10, including Appendix A and manufacturer's written instructions unless otherwise indicated.

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Test and inspect each automatic door operator installation, using AAADM inspection forms, to determine compliance of installed systems with applicable BHMA standards.

B. Automatic door operators will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.4 ADJUSTING

A. Adjust automatic door operators to function smoothly, and lubricate as recommended by manufacturer; comply with requirements of applicable BHMA standards.

1. Adjust operators on exterior doors for weathertight closure.

B. After completing installation of automatic door operators, inspect exposed finishes on doors and operators. Repair damaged finish to match original finish.

C. Readjust automatic door operators and controls after repeated operation of completed installation equivalent to three days' use by normal traffic (100 to 300 cycles).

D. Occupancy Adjustment: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain automatic door operators.

END OF SECTION 087113

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Glass for windows, doors, interior borrowed lites and storefront framing.
2. Glazing sealants and accessories.

B. Related Requirements:

1. Section 057300 "Decorative Metal Railings" for glazing in railings.
2. Section 088113 "Decorative Glass Glazing."
3. Section 088300 "Mirrors."
4. Section 088813 "Fire-Resistant Glazing."

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. FBC: Florida Building Code

E. Interspace: Space between lites of an insulating-glass unit.

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 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Glazing Accessory Samples: For sealants and colored spacers, in 12-inch (300-mm) lengths. Install sealant Samples between two strips of material representative in color of the adjoining framing system.

C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

D. 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.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer manufacturers of insulating-glass units with sputter-coated, low-E coatings glass testing agency and sealant testing agency.

B. Product Certificates: For glass.

C. Product Test Reports: For coated glass insulating glass and 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.

E. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, 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. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

E. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Install glazing in mockups specified in Section 084113 "Aluminum-Framed Entrances and Storefronts" to match glazing systems required for Project, including glazing methods.
2. 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 Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1. Testing is not 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 enough 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.

1.8 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.

1.9 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 (4.4 deg C).

1.10 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. AGC Glass Company North America, Inc.
    b. Oldcastle BuildingEnvelope™.
    c. PPG Industries, Inc.
    d. Viracon, Inc.

B. 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.

C. 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.

C. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E 1300.

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.
    b. Basic Wind Speed: Refer to Structural Drawings.
    c. Importance Factor: Refer to Structural Drawings.
    d. Exposure Category: Refer to Structural Drawings.
3. Thickness of Patterned Glass: Base design of patterned glass on thickness at thinnest part of the glass.
4. Probability of Breakage for Sloped Glazing: For glass surfaces sloped more than 15 degrees from vertical, design glass for a probability of breakage not greater than 0.001.
5. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch (25 mm), whichever is less.
6. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

D. Windborne-Debris-Impact Resistance: Exterior glazing shall comply with enhanced-protection testing requirements in ASTM E 1996 for Wind Zone indicated on Structural Drawings when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than glazing indicated for use on Project and shall be installed in same manner as glazing indicated for use on Project.

1. Large-Missile Test: For glazing located within 30 feet (9.1 m) of grade.
2. Small-Missile Test: For glazing located more than 30 feet (9.1 m) above grade.

E. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

F. 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 (W/sq. m x K).
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.

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: "Laminated Glazing Reference Manual" and "Glazing Manual."
2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped Glazing Guidelines."
3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
4. 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 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. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.

1. Minimum Glass Thickness for Exterior Lites: 6 mm.
2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.

E. Strength: Where annealed 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. 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. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

A. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.

B. Tinted Annealed Float Glass: ASTM C 1036, Type I, Class 2 (tinted), Quality-Q3.

C. Fully Tempered 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.

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. Silicone-Coated Spandrel Glass: ASTM C 1048, Type I, Condition C, Quality-Q3.

2.5 LAMINATED GLASS

A. Laminated Glass: ASTM C 1172. 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 polyvinyl butyral interlayer, ionomeric polymer interlayer or cast-in-place and cured-transparent-resin interlayer to comply with interlayer manufacturer's written instructions.
2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

B. Windborne-Debris-Impact-Resistant Laminated Glass: Comply with requirements specified above for laminated glass except laminate glass with one of the following to comply with interlayer manufacturer's written instructions:

1. Polyvinyl butyral interlayer.
2. Polyvinyl butyral interlayers reinforced with polyethylene terephthalate film.
3. Ionomeric polymer interlayer.
4. Cast-in-place and cured-transparent-resin interlayer.
5. Cast-in-place and cured-transparent-resin interlayer reinforced with polyethylene terephthalate film.

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 manufacturer's standard primary and secondary sealants.
2. Spacer: Manufacturer's standard spacer material and construction.
3. Desiccant: Molecular sieve or silica gel, or a blend of both.

2.7 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. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Field-applied sealants shall have a VOC content of not more than 250 g/L.
4. 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.

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. Dow Corning Corporation.
    b. GE Construction Sealants; Momentive Performance Materials Inc.
    c. Tremco Incorporated.

2. Applications: For impact glazing.

C. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.

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-Construction Systems.
    b. Dow Corning Corporation.
    c. GE Construction Sealants; Momentive Performance Materials Inc.
    d. Tremco Incorporated.

2. Applications: Interior glazing.

2.8 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. 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.

2.9 MISCELLANEOUS GLAZING MATERIALS

A. General: 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.

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.

2.10 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 (67 deg C), ambient; 180 deg F (100 deg C), 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.

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. 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.

B. 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.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. 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.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

G. 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.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

J. 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.

K. 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 CLEANING AND PROTECTION

A. Immediately after installation remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. 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.

1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

D. 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.

3.8 MONOLITHIC GLASS SCHEDULE

A. Glass Type GL-01: Clear fully tempered float glass.

1. Minimum Thickness: 6 mm.
2. Safety glazing required.

3.9 LAMINATED GLASS SCHEDULE

A. Glass Type GL-11: Low-E-coated, laminated vision glass with two plies of clear heat-strengthened float glass.

1. Basis-of-Design Product: Viracon.
2. Minimum Thickness of Each Glass Ply: 6 mm.
3. Interlayer Thickness: 0.060 inch (1.52 mm).
4. Low-E Coating: Sputtered on second surface.
5. Winter Nighttime U-Factor: 0.29 maximum.
6. Summer Daytime U-Factor: 0.25 maximum.
7. Visible Light Transmittance: 46 percent minimum.
8. Solar Heat Gain Coefficient: 0.29 maximum.
9. Safety glazing required.

3.10 INSULATING-LAMINATED-GLASS SCHEDULE

A. Glass Type GL-21: Low-E-coated, clear insulating laminated glass.

1. Basis-of-Design Product: Viracon- VUE1-50.
2. Overall Unit Thickness: 1 1/4 inch (31.75 mm).
3. Minimum Thickness of Outdoor Lite: 6 mm.
4. Outdoor Lite: Fully tempered float glass.
5. Interspace Content: Argon.
6. Indoor Lite: Clear laminated glass with two plies of heat-strengthened float glass.
    a. Minimum Thickness of Each Glass Ply: 6 mm.
    b. Interlayer Thickness: 0.060 inch (1.52 mm).
7. Low-E Coating: Sputtered on second surface.
8. Winter Nighttime U-Factor: 0.29 maximum.
9. Summer Daytime U-Factor: 0.25 maximum.
10. Visible Light Transmittance: 46 percent minimum.
11. Solar Heat Gain Coefficient: 0.29 maximum.
12. Safety glazing required.

3.11 INSULATING GLASS SCHEDULE

A. Glass Type GL-22: Low-E-coated, clear insulating glass.

1. Basis-of-Design Product: Viracon VUE1-48.
2. Overall Unit Thickness: 1 inch (25 mm).
3. Minimum Thickness of Each Glass Lite: 6 mm.
4. Outdoor Lite: Annealed float glass.
5. Interspace Content: Argon.
6. Indoor Lite: Annealed float glass.
7. Low-E Coating: Pyrolytic or sputtered on second or third surface.
8. Winter Nighttime U-Factor: .29 maximum.
9. Summer Daytime U-Factor: .26 maximum.
10. Visible Light Transmittance: 46 percent minimum.
11. Solar Heat Gain Coefficient: .29 maximum.

B. Glass Type GL-32: Ceramic-coated, low-E, insulating spandrel glass.

1. Basis-of-Design Product: Viracon VE1-48 Spandrel.
2. Coating Color: As selected by Architect from manufacturer's full range.
3. Overall Unit Thickness: 1 inch (25 mm).
4. Minimum Thickness of Each Glass Lite: 6 mm.
5. Outdoor Lite: Annealed float glass.
6. Interspace Content: Argon.
7. Indoor Lite: Annealed float glass.
8. Low-E Coating: Pyrolytic or sputtered on second or third surface.
9. Opaque Coating Location: Fourth surface.
10. Winter Nighttime U-Factor: .31 maximum.
11. Summer Daytime U-Factor: .29 maximum.

END OF SECTION 088000

SECTION 088300 - MIRRORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes the following types of silvered flat glass mirrors:

1. Annealed monolithic glass mirrors.
2. Film-backed and Laminated glass mirrors qualifying as safety glazing.

B. Related Requirements:

1. Section 088000 "Glazing" for glass with reflective coatings used for vision and spandrel lites.
2. Section 102800 "Toilet, Bath, and Laundry Accessories" for metal-framed mirrors.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Mirrors. Include description of materials and process used to produce each type of silvered flat glass mirror specified that indicates sources of glass, glass coating components, edge sealer, and quality-control provisions.

B. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachment details.

C. Samples: For each type of the following:

1. Mirrors: 12 inches (300 mm) square, including edge treatment on two adjoining edges.
2. Mirror Clips: Full size.
3. Mirror Trim: 12 inches (300 mm) long.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of mirror and mirror mastic.

C. Preconstruction Test Reports: From mirror manufacturer indicating that mirror mastic was tested for compatibility and adhesion with mirror backing and substrates on which mirrors are installed.

D. Sample Warranty: For special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For mirrors to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. 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.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect mirrors according to mirror manufacturer's written instructions and as needed to prevent damage to mirrors from moisture, condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with mirror manufacturer's written instructions for shipping, storing, and handling mirrors as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not install mirrors until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.

1. Warranty Period: 10 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. Guardian Industries Corp.; SunGuard.
2. National Glass Industries.
3. Trulite Glass & Aluminum Solutions, LLC.
4. Walker Glass Co., Ltd.

B. Source Limitations for Mirrors: Obtain mirrors from single source from single manufacturer.

C. Source Limitations for Mirror Accessories: Obtain mirror glazing accessories from single source.

2.2 SILVERED FLAT GLASS MIRRORS

A. Mirrors, General: ASTM C 1503.

B. Annealed Monolithic Glass Mirrors: Mirror Glazing Quality, clear.

1. Nominal Thickness: 6.0 mm.

C. Laminated Mirrors: ASTM C 1172, Type II.

1. Glass for Outer Lite: Annealed float glass, Mirror Glazing Quality, clear.

2. Nominal Thickness for Outer Lite: 4.0 mm.
3. Glass for Inner Lite: Annealed float glass; ASTM C 1036, Type I (transparent flat glass), Quality-Q3; Class 1 (clear).
4. Nominal Thickness: 4.0 mm.
5. Interlayer: Mirror manufacturer's standard 0.030-inch- (0.76-mm-) thick, clear polyvinyl-butyral interlayer with a proven record of showing no tendency to delaminate from, or cause damage to, silver coating.

D. Safety Glazing Products: For film-backed and laminated mirrors, provide products that comply with 16 CFR 1201, Category II.

2.3 MISCELLANEOUS MATERIALS

A. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

B. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for use in protecting against silver deterioration at mirrored glass edges.

C. Mirror Mastic: An adhesive setting compound, asbestos-free, produced specifically for setting mirrors and certified by both mirror and mastic manufacturer as compatible with glass coating and substrates on which mirrors will be installed.

1. Adhesive shall have a VOC content of 70 g/L or less.

D. Film Backing for Safety Mirrors: Film backing and pressure-sensitive adhesive; both compatible with mirror backing paint as certified by mirror manufacturer.

2.4 MIRROR HARDWARE

A. Aluminum J-Channels and Cleat: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover edges of mirrors in a single piece.

1. Bottom Trim: J-channels formed with front leg and back leg not less than 5/16 and 3/4 inch (7.9 and 19 mm) in height, respectively.
2. Top Trim: Formed with front leg with a height matching bottom trim and back leg designed to fit into the pocket created by wall-mounted aluminum cleat.
3. Finish: Clear bright anodized.

B. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

C. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield, expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

2.5 FABRICATION

A. Fabricate mirrors in the shop to greatest extent possible.

B. Fabricate cutouts for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrors.

C. Mirror Edge Treatment: Flat polished.

1. Seal edges of mirrors with edge sealer after edge treatment to prevent chemical or atmospheric penetration of glass coating.

D. Film-Backed Safety Mirrors: Apply film backing with adhesive coating over mirror backing paint, as recommended in writing by film-backing manufacturer, to produce a surface free of bubbles, blisters, and other imperfections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance of the Work.

B. Verify compatibility with and suitability of substrates, including compatibility of existing finishes or primers with mirror mastic.

C. Proceed with installation only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 PREPARATION

A. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating substrates with mastic manufacturer's special bond coating where applicable.

3.3 INSTALLATION

A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.

1. GANA Publications: "Laminated Glazing Reference Manual," "Glazing Manual" and "Mirrors, Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors."

B. Provide a minimum airspace of 1/8 inch (3 mm) between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.

C. Install mirrors with mastic and mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.

1. Aluminum J-Channels: Provide setting blocks 1/8 inch (3 mm) thick by 4 inches (100 mm) long at quarter points. To prevent trapping water, provide, between setting blocks, two slotted weeps not less than 1/4 inch (6.4 mm) wide by 3/8 inch (9.5 mm) long at bottom channel.
2. Aluminum J-Channels and Cleat: Fasten J-channel directly to wall and attach top trim to continuous cleat fastened directly to wall.
3. Install mastic as follows:
    a. Apply barrier coat to mirror backing where approved in writing by manufacturers of mirrors and backing material.
    b. Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.
    c. After mastic is applied, align mirrors and press into place while maintaining a minimum airspace of 1/8 inch (3 mm) between back of mirrors and mounting surface.
4. Provide laminated or film-backed safety mirrors at all locations within the Memory Care or Dementia Unit.

3.4 CLEANING AND PROTECTION

A. Protect mirrors from breakage and contaminating substances resulting from construction operations.

B. Do not permit edges of mirrors to be exposed to standing water.

C. Maintain environmental conditions that prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.

D. Clean exposed surface of mirrors not more than four days before date scheduled for inspections that establish date of Substantial Completion. Clean mirrors as recommended in writing by mirror manufacturer.

END OF SECTION 088300

SECTION 088813 - FIRE-RESISTANT GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fire-protection-rated glazing.
2. Fire-resistance-rated glazing.

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.

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 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Glass Samples: For each type of glass product; 12 inches (300 mm) square.

C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For installers.

B. Product Certificates: For each type of glass and glazing product, from manufacturer.

C. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

A. 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.

1.7 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.

1.8 FIELD CONDITIONS

A. Environmental Limitations: 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.

1.9 WARRANTY

A. Manufacturer's Special Warranty on 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.

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 impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; deterioration of glazing materials; or other defects in construction.

2.3 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organization below unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."

B. Safety Glazing Labeling: Permanently mark glazing with certification label of the Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction or the manufacturer. Label shall indicate manufacturer's name, type of glass, glass thickness, and safety glazing standard with which glass complies.

2.4 GLASS PRODUCTS

A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.

B. Ultraclear Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear), with visible light transmission not less than 91 percent.

C. Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class I (clear) unless otherwise 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.

D. Laminated Glass: ASTM C 1172. 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 polyvinyl butyral interlayer unless fire-protection or fire-resistance rating is based on another product.
2. Interlayer Thickness: Provide thickness as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

2.5 FIRE-PROTECTION-RATED GLAZING

A. Fire-Protection-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.

B. 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 permitted to be used in doors or openings; if permitted in openings, whether or not glazing has passed the hose-stream test; whether or not glazing meets 450 deg F (250 deg C) temperature-rise limitation; and the fire-resistance rating in minutes.

C. 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.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. AGC Glass Company North America, Inc.
b. SAFTI FIRST Fire Rated Glazing Solutions.
c. Schott North America, Inc.
d. Technical Glass Products.
e. Vetrotech Saint-Gobain.

D. 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.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. AGC Glass Company North America, Inc.
b. Pilkington North America.
c. Technical Glass Products.
d. Vetrotech Saint-Gobain.

2.6 FIRE-RESISTANCE-RATED GLAZING

A. Fire-Resistance-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.

B. Fire-Resistance-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.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. AGC Glass Company North America, Inc.
b. Pilkington North America.
c. SAFTI FIRST Fire Rated Glazing Solutions.
d. Technical Glass Products.
e. Vetrotech Saint-Gobain.

2.7 GLAZING ACCESSORIES

A. 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. 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. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Dow Corning Corporation.
    b. GE Construction Sealants; Momentive Performance Materials Inc.
    c. Tremco Incorporated.

2. Sealants shall have a VOC content of 250 g/L or less.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

C. 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.

D. 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.

2.8 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. 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.

C. 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.

2.9 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.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with manufacturing and installation tolerances, including those for size, squareness, and offsets at corners, and for compliance with minimum required face and edge clearances.

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 fire side and protected side. Label or mark units as needed so that fire side and protected side are readily identifiable. Do not use materials that leave visible marks in the completed work.

3.3 GLAZING, GENERAL

A. Use methods approved by testing agencies that listed and labeled fire-resistant glazing products.

B. 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.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Set glass lites with proper orientation so that coatings face fire side or protected side as specified.

J. 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.

K. 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 and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. 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.

D. 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. 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 washaway from glass.

3.7 CLEANING AND PROTECTION

A. Immediately after installation, remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. 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.

1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Remove and replace glass that is damaged during construction period.

D. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.8 FIRE-PROTECTION-RATED GLAZING SCHEDULE

A. Glass Type FPGL-01: 20-minute fire-protection-rated glazing with hose-stream test; film-faced ceramic glazing.

B. Glass Type FPGL-02: 45-minute fire-protection-rated glazing; film-faced ceramic glazing, laminated ceramic glazing or laminated glass with intumescent interlayers.

C. Glass Type FPGL-03: 60-minute fire-protection-rated glazing with 450 deg F (250 deg C) temperature-rise limitation; laminated glass with intumescent interlayers.

3.9 FIRE-RESISTANCE-RATED GLAZING SCHEDULE

A. Glass Type FRGL-04: 90-minute fire-resistance-rated glazing with 450 deg F (250 deg C) temperature-rise limitation; laminated glass with intumescent interlayers.

END OF SECTION 088813

SECTION 089119 - FIXED LOUVERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Fixed extruded-aluminum louvers.

B. Related Requirements:

1. Section 081113 "Hollow Metal Doors and Frames" for louvers in hollow-metal doors.
2. Section 081416 "Flush Wood Doors" for louvers in flush wood doors.

1.3 DEFINITIONS

A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.

B. Horizontal Louver: Louver with horizontal blades (i.e., the axis of the blades are horizontal).

C. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.

D. Wind-Driven-Rain-Resistant Louver: Louver that provides specified wind-driven-rain performance, as determined by testing according to AMCA 500-L.

E. Windborne-Debris-Impact-Resistant Louver: Louver that provides specified windborne-debris-impact resistance, as determined by testing according to AMCA 540.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.

B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.

1. Show weep paths, gaskets, flashings, sealants, and other means of preventing water intrusion.
2. Show mullion profiles and locations.

C. Samples: For each type of metal finish required.

1.5 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Based on evaluation of comprehensive tests performed according to AMCA 500-L by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver and showing compliance with performance requirements specified.

B. Windborne-debris-impact-resistance test reports.

C. Sample Warranties: For manufacturer's special warranties.

1.6 QUALITY ASSURANCE

1.7 FIELD CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.8 WARRANTY

A. Special Finish Warranty: Manufacturer agrees to repair or replace components on which finishes fail in materials or workmanship 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 D2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain fixed and operable louvers from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

2.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.

1. Wind Loads: Determine loads based on pressures as indicated on Drawings.

B. Windborne-Debris-Impact Resistance: Louvers located within 30 feet (9.1 m) of grade shall pass enhanced protection, when tested according to AMCA 540.

C. Seismic Performance: As indicated on drawings.

D. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

F. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

2.3 FIXED EXTRUDED-ALUMINUM LOUVERS

A. Horizontal, Drainable-Blade, Windborne-Debris-Impact-Resistant Louver:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Construction Specialties, Inc.
    b. Greenheck Fan Corporation.
    c. Ruskin Company.
2. Louver Depth: 4 inches (100 mm).
3. Frame and Blade Nominal Thickness: Not less than 0.080 inch (2.03 mm).
4. Mullion Type: Exposed.
5. Louver Performance Ratings:

    a. Free Area: Not less than 8.5 sq. ft. (0.79 sq. m) for 48-inch- (1220-mm-) wide by 48-inch- (1220-mm-) high louver.
    b. Point of Beginning Water Penetration: Not less than 1077 fpm (5.5 m/s).
    c. Air Performance: Not more than 0.15-inch wg (37-Pa) static pressure drop at 1077-fpm (5.5-m/s) free-area exhaust velocity.

6. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

7. AMCA Rating: AMCA 540.

2.4 LOUVER SCREENS

A. General: Provide screen at each exterior attic vent louver.

1. Screen Location for Fixed Louvers: Interior face.
2. Screening Type: Insect screening.

B. Secure screen frames to louver frames with stainless-steel machine screws, spaced a maximum of 6 inches (150 mm) from each corner and at 12 inches (300 mm) o.c.

C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.

1. Metal: Same type and form of metal as indicated for louver to which screens are attached. Reinforce extruded-aluminum screen frames at corners with clips.
2. Finish: Mill finish unless otherwise indicated.
3. Type: Rewirable frames with a driven spline or insert.

D. Louver Screening for Aluminum Louvers:
1. Insect Screening: Aluminum, 18-by-16 (1.4-by-1.6-mm) mesh, 0.012-inch (0.30-mm) wire.

2.5 MATERIALS

A. Aluminum Extrusions: ASTM B221 (ASTM B221M), Alloy 6063-T5, T-52, or T6.

B. Aluminum Sheet: ASTM B209 (ASTM B209M), Alloy 3003 or 5005, with temper as required for forming, or as otherwise recommended by metal producer for required finish.

C. Fasteners: Use types and sizes to suit unit installation conditions.

1. Use hex-head or Phillips pan-head screws for exposed fasteners unless otherwise indicated.
2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
3. For color-finished louvers, use fasteners with heads that match color of louvers.

D. Postinstalled Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, fabricated from stainless-steel components, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing according to ASTM E488/E488M conducted by a qualified testing agency.

E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.6 FABRICATION

A. Factory assemble louvers to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

B. Vertical Assemblies: Where height of louver units exceeds fabrication and handling limitations, fabricate units to permit field-bolted assembly with close-fitting joints in jambs and mullions, reinforced with splice plates.

C. Maintain equal louver blade spacing to produce uniform appearance.

D. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.

E. Include supports, anchorages, and accessories required for complete assembly.

F. Provide vertical mullions of type and at spacings indicated, but not more than is recommended by manufacturer, or 72 inches (1830 mm) o.c., whichever is less.
   1. Exposed Mullions: Where indicated, provide units with exposed mullions of same width and depth as louver frame. Where length of louver exceeds fabrication and handling limitations, provide interlocking split mullions designed to permit expansion and contraction.

G. Provide subsills made of same material as louvers or extended sills for recessed louvers.

H. Join frame members to each other and to fixed louver blades with fillet welds concealed from view, threaded fasteners, or both, as standard with louver manufacturer unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.7 ALUMINUM FINISHES

A. Finish louvers after assembly.

B. High-Performance Organic Finish: Three-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

   1. Color and Gloss: Match Architect's sample.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and openings, 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. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.

B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.

C. Form closely fitted joints with exposed connections accurately located and secured.

D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

E. Protect unpainted galvanized- and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.

F. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 079200 "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

A. Clean exposed louver surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.

B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.

C. Restore louvers damaged during installation and construction, so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 089119

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior partitions.
2. Suspension systems for interior ceilings and soffits.
3. Grid suspension systems for gypsum board ceilings.

B. Related Requirements:

1. Section 054000 "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; and roof rafters and ceiling joists.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of code-compliance certification for studs and tracks.

B. Evaluation Reports: For embossed, high-strength steel studs and tracks firestop tracks 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. 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.

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, according to ASTM E119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C645 requirements for steel unless otherwise indicated.
2. Protective Coating: ASTM A653/A653M, G40 (Z120), hot-dip galvanized unless otherwise indicated.

B. Studs and Tracks: ASTM C645. Use either conventional steel studs and tracks or embossed, high-strength steel studs and tracks.

1. Steel Studs and Tracks:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Allsteel & Gypsum Products Inc.
2) ClarkDietrich.
3) MarinoWARE.
4) SCAFCO Steel Stud Company.
5) Steel Construction Systems.

b. Minimum Base-Steel Thickness: 0.0269 inch (0.683 mm) @ drywall assemblies and 0.0296 inch (0.752 mm) @ cement board/tile wall assemblies.
c. Depth: As indicated on Drawings.

2. Embossed, High Strength Steel Studs and Tracks: Roll-formed and embossed with surface deformations to stiffen the framing members so that they are structurally comparable to conventional ASTM C645 steel studs and tracks.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Allsteel & Gypsum Products Inc.
2) ClarkDietrich.
3) MarinoWARE.
4) SCAFCO Steel Stud Company.

5) Steel Construction Systems.

b. Minimum Base-Steel Thickness: 0.0190 inch (0.483 mm) and 20 ga. eq. min. @ cement board/tile wall assemblies
c. Depth: As indicated on Drawings.

C. Slip-Type Head Joints: Where indicated, provide one of the following:

1. Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing 1-1/2-inch (38-mm) minimum vertical movement.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Allsteel & Gypsum Products Inc.
2) ClarkDietrich.
3) MarinoWARE.
4) SCAFCO Steel Stud Company.
5) Steel Construction Systems.

2. Single Long-Leg Track System: ASTM C645 top track with 2-inch- (51-mm-) deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top track and with continuous bridging located within 12 inches (305 mm) of the top of studs to provide lateral bracing.
3. Double-Track System: ASTM C645 top outer tracks, inside track with 2-inch- (51-mm-) deep flanges in thickness not less than indicated for studs and fastened to studs, and outer track sized to friction-fit over inner track.
4. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Allsteel & Gypsum Products Inc.
2) ClarkDietrich.
3) MarinoWARE.
4) SCAFCO Steel Stud Company.
5) Steel Construction Systems.

D. Firestop Tracks: Top track 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.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Allsteel & Gypsum Products Inc.
b. ClarkDietrich.
c. MarinoWARE.

d. SCAFCO Steel Stud Company.
e. Steel Construction Systems.

E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Allsteel & Gypsum Products Inc.
b. ClarkDietrich.
c. MarinoWARE.
d. SCAFCO Steel Stud Company.
e. Steel Construction Systems.

2. Minimum Base-Steel Thickness: 0.0329 inch (0.836 mm) or as specifically identified on Drawings for Kitchen or Structural elements.

F. Cold-Rolled Channel Bridging: Steel, 0.0538-inch (1.367-mm) minimum base-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Allsteel & Gypsum Products Inc.
b. ClarkDietrich.
c. MarinoWARE.
d. SCAFCO Steel Stud Company.
e. Steel Construction Systems.

2. Depth: As indicated on Drawings.
3. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38 by 38 mm), 0.068-inch- (1.72-mm-) thick, galvanized steel.

G. Hat-Shaped, Rigid Furring Channels: ASTM C645.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Allsteel & Gypsum Products Inc.
b. ClarkDietrich.
c. MarinoWARE.
d. SCAFCO Steel Stud Company.
e. Steel Construction Systems.

2. Minimum Base-Steel Thickness: 0.0296 inch (0.752 mm).
3. Depth: 7/8 inch (22.2 mm).

H. Resilient Furring Channels: 1/2-inch- (13-mm-) deep, steel sheet members designed to reduce sound transmission.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Allsteel & Gypsum Products Inc.
    b. ClarkDietrich.
    c. MarinoWARE.
    d. SCAFCO Steel Stud Company.
    e. Steel Construction Systems.

2. Configuration: Asymmetrical.

I. Cold-Rolled Furring Channels: 0.053-inch (1.34-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges.

1. Depth: 3/4 inch (19 mm).
2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329 inch (0.8 mm).
3. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.

J. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches (32 mm), wall attachment flange of 7/8 inch (22 mm), minimum uncoated-steel thickness of 0.0179 inch (0.455 mm), and depth required to fit insulation thickness indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Allsteel & Gypsum Products Inc.
    b. ClarkDietrich.
    c. MarinoWARE.
    d. SCAFCO Steel Stud Company.
    e. Steel Construction Systems.

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.

B. Hanger Attachments to Concrete:

1. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 or AC193 as appropriate for the substrate.

    a. Uses: Securing hangers to structure.
    b. Type: Torque-controlled, expansion anchor.
    c. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941 (ASTM F1941M), Class Fe/Zn 5, unless otherwise indicated.

d. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F593 (ASTM F738M), and nuts, ASTM F594 (ASTM F836M).

2. Power-Actuated Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

C. Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.16 inch (4.12 mm) in diameter.

D. Flat Hangers: Steel sheet, 1 by 3/16 inch (25 by 5 mm) by length indicated.

E. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-steel thickness of 0.0538 inch (1.367 mm) and minimum 1/2-inch- (13-mm-) wide flanges.

1. Depth: 2-1/2 inches (64 mm).

F. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 0.0538-inch (1.367-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges, 3/4 inch (19 mm) deep.
2. Steel Studs and Tracks: ASTM C645.

a. Minimum Base-Steel Thickness: 0.0296 inch (0.752 mm).
b. Depth: 2-1/2 inches (64 mm).

3. Embossed, High-Strength Steel Studs and Tracks: ASTM C645.

a. Minimum Base-Steel Thickness: 0.0190 inch (0.483 mm).
b. Depth: 2-1/2 inches (64 mm).

4. Hat-Shaped, Rigid Furring Channels: ASTM C645, 7/8 inch (22 mm) deep.

a. Minimum Base-Steel Thickness: 0.0296 inch (0.752 mm).

5. Resilient Furring Channels: 1/2-inch- (13-mm-) deep members designed to reduce sound transmission.

a. Configuration: Asymmetrical.

G. Grid Suspension System for Gypsum Board Ceilings: ASTM C645, direct-hung system composed of main beams and cross-furring members that interlock.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Armstrong Ceiling & Wall Solutions.
b. CertainTeed LLC; Saint-Gobain North America.
c. USG Corporation.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide the following:
1. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.

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 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 (610 mm) 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 C754.

1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C841 that apply to framing installation.
2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C1063 that apply to framing installation.
3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C844 that apply to framing installation.
4. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 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 (406 mm) o.c. unless otherwise indicated.
2. Multilayer Application: 16 inches (406 mm) o.c. unless otherwise indicated.
3. Tile Backing Panels: 16 inches (406 mm) 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. Install studs so flanges within framing system point in same direction.

D. Install tracks 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 track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb unless otherwise indicated.

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.
6. Curved Partitions:

    a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
    b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches (150 mm) o.c.

E. 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 (610 mm) o.c.

F. 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 (610 mm) 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 (610 mm) 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 (305 mm) from corner and cut insulation to fit.

G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

3.5 INSTALLING CEILING SUSPENSION SYSTEMS

A. 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 (1219 mm) max o.c.
2. Carrying Channels (Main Runners): 48 inches (1219 mm) max o.c.
3. Furring Channels (Furring Members): 16 inches (406 mm) o.c.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. 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.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Seismic Bracing: Sway-brace suspension systems with hangers used for support on projects in zones designated as Seismic in Structural Drawings.

F. 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.

G. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

SECTION 092400 - CEMENT PLASTERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Exterior vertical plasterwork (stucco).
2. Exterior horizontal and nonvertical plasterwork (stucco).
3. Interior vertical plasterwork.
4. Interior horizontal and nonvertical plasterwork.

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: Show locations and installation of control and expansion joints, including plans, elevations, sections, details of components, and attachments to other work.

C. Samples: For each type of factory-prepared finish coat and for each color and texture specified.

1.5 QUALITY ASSURANCE

A. 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 mockups for each substrate and finish texture indicated for cement plastering, including accessories.

a. Size: 100 sq. ft. (9 sq. m) in surface area.

2. For interior plasterwork, simulate finished lighting conditions for review of mockups.
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 inside under cover, and keep them dry and protected against damage from weather, moisture, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

1.7 FIELD CONDITIONS

A. Comply with ASTM C 926 requirements.

B. Exterior Plasterwork:

1. Apply and cure plaster to prevent plaster drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
2. Apply plaster when ambient temperature is greater than 40 deg F (4.4 deg C).
3. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.

C. Interior Plasterwork: Maintain room temperatures at greater than 40 deg F (4.4 deg C) for at least 48 hours before plaster application, and continuously during and after application.

1. Avoid conditions that result in plaster drying out during curing period. Distribute heat evenly; prevent concentrated or uneven heat on plaster.
2. Ventilate building spaces as required to remove water in excess of that required for hydrating plaster in a manner that prevents drafts of air from contacting surfaces during plaster application and until plaster is dry.

D. Factory-Prepared Finishes: Comply with manufacturer's written recommendations for environmental conditions for applying finishes.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: Where indicated, provide cement plaster assemblies identical to those of assemblies tested for fire resistance according to ASTM E 119 by a qualified testing agency.

2.2 METAL LATH

A. Expanded-Metal Lath: ASTM C 847, cold-rolled carbon-steel sheet with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized-zinc coating.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Alabama Metal Industries Company; a Gibraltar Industries company.
    b. CEMCO; California Expanded Metal Products Co.
    c. ClarkDietrich Building Systems.
    d. Marino\WARE.
2. Diamond-Mesh Lath: Self-furring, 3.4 lb/sq. yd. (1.8 kg/sq. m).

B. Paper Backing: FS UU-B-790a, Type I, Grade B, Style 1a vapor-retardant paper.

1. Provide paper-backed lath at exterior locations applied to sheathing.

2.3 ACCESSORIES

A. General: Comply with ASTM C 1063, and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.

B. Metal Accessories:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Alabama Metal Industries Company; a Gibraltar Industries company.
    b. CEMCO; California Expanded Metal Products Co.
    c. ClarkDietrich Building Systems.
    d. Marino\WARE.

2. Foundation Weep Screed: Fabricated from hot-dip galvanized-steel sheet, ASTM A 653/A 653M, G60 (Z180) zinc coating.
3. Cornerite: Fabricated from metal lath with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized-zinc coating.
4. External- (Outside-) Corner Reinforcement: Fabricated from metal lath with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized-zinc coating.

C. Plastic Accessories: Manufactured from high-impact PVC.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Alabama Metal Industries Company; a Gibraltar Industries company.
    b. Phillips Manufacturing Co.
    c. Plastic Components, Inc.
    d. Vinyl Corp; a division of ClarkDietrich Building Systems.

2. Cornerbeads: With perforated flanges.

    a. Smallnose cornerbead; use unless otherwise indicated.
    b. Bullnose cornerbead, radius 3/4-inch (19-mm) minimum; use at locations indicated on Drawings.

3. Casing Beads: With perforated flanges in depth required to suit plaster bases indicated and flange length required to suit applications indicated.

   a. Square-edge style; use unless otherwise indicated.
   b. Bullnose style, radius 3/4-inch (19-mm) minimum; use at locations indicated on Drawings.

4. Control Joints: One-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
5. Expansion Joints: Two-piece type, formed to produce slip-joint and square-edged 1-inch-(25-mm-) wide reveal; with perforated concealed flanges.

2.4 MISCELLANEOUS MATERIALS

A. Water for Mixing and Finishing Plaster: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.

B. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch (13 mm) long, free of contaminants, manufactured for use in cement plaster.

C. Bonding Compound: ASTM C 932.

D. Fasteners for Attaching Metal Lath to Substrates: ASTM C 1063.

E. Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch (1.21-mm) diameter unless otherwise indicated.

F. Sound-Attenuation Blankets: 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.

2.5 PLASTER MATERIALS

A. Portland Cement: ASTM C 150/C 150M, Type I.

   1. Color for Finish Coats: Gray.

B. Lime: ASTM C 206, Type S; or ASTM C 207, Type S.

C. Sand Aggregate: ASTM C 897.

   1. Color for Job-Mixed Finish Coats: White.

D. Ready-Mixed Finish-Coat Plaster: Mill-mixed portland cement, aggregates, coloring agents, and proprietary ingredients.

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. Florida Stucco.
    b. QUIKRETE.
    c. SonoWall, BASF Corp.
    d. Sto Corp.

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

2.6 PLASTER MIXES

A. General: Comply with ASTM C 926 for applications indicated.

1. Fiber Content: Add fiber to base-coat mixes after ingredients have mixed at least two minutes. Comply with fiber manufacturer's written instructions for fiber quantities in mixes, but do not exceed 1 lb of fiber/cu. yd. (0.6 kg of fiber/cu. m) of cementitious materials.

B. Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork as follows:

1. Portland and Masonry Cement Mixes:

    a. Scratch Coat: For cementitious material, mix 1 part portland cement and 1 part masonry cement. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
    b. Brown Coat: For cementitious material, mix 1 part portland cement and 1 part masonry cement. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.

C. Base-Coat Mixes for Use over Concrete: Single base (scratch) coat for two-coat plasterwork on low-absorption plaster bases as follows:

1. Portland and Masonry Cement Mix: For cementitious material, mix 1 part portland cement and 1 part masonry cement. Use 2-1/2 to 4 parts aggregate per part of cementitious material.

D. Base-Coat Mixes for Use over Unit Masonry: Single base (scratch) coat for two-coat plasterwork on high-absorption plaster bases as follows:

1. Portland and Masonry Cement Mix: For cementitious material, mix 1 part portland cement and 1 part masonry cement. Use 2-1/2 to 4 parts aggregate per part of cementitious material.

E. Job-Mixed Finish-Coat Mixes:

1. Portland Cement Mix: For cementitious materials, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 1-1/2 to 3 parts aggregate per part of cementitious material.

F. Factory-Prepared Finish-Coat Mixes: For ready-mixed finish-coat plasters, comply with manufacturer's written instructions.

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. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.

B. Prepare smooth, solid substrates for plaster according to ASTM C 926.

3.3 INSTALLATION, GENERAL

A. Fire-Resistance-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Drawings.

B. Sound-Attenuation Blankets: Where required, install blankets before installing lath unless blankets are readily installed after lath has been installed on one side.

3.4 INSTALLING METAL LATH

A. Metal Lath: Install according to ASTM C 1063.

1. Partition Framing and Vertical Furring: Install flat-diamond-mesh lath.
2. Flat-Ceiling and Horizontal Framing: Install flat-diamond-mesh lath.
3. Curved-Ceiling Framing: Install flat-diamond-mesh lath.
4. On Solid Surfaces, Not Otherwise Furred: Install self-furring, diamond-mesh lath.

3.5 INSTALLING ACCESSORIES

A. Install according to ASTM C 1063 and at locations indicated on Drawings.

B. Reinforcement for External (Outside) Corners:

1. Install cornerbead at exterior locations.
2. Install cornerbead at interior locations.

C. Control Joints: Locate as approved by Architect for visual effect and as follows unless noted on the Drawings as otherwise:

1. As required to delineate plasterwork into areas (panels) of the following maximum sizes:

a. Vertical Surfaces: 144 sq. ft. (13.4 sq. m).
b. Horizontal and Other Nonvertical Surfaces: 100 sq. ft. (9.3 sq. m).

2. At distances between control joints of not greater than 18 feet (5.5 m) o.c.
3. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.
4. Where control joints occur in surface of construction directly behind plaster.
5. Where plasterwork areas change dimensions, to delineate rectangular-shaped areas (panels) and to relieve the stress that occurs at the corner formed by the dimension change.

3.6 PLASTER APPLICATION

A. General: Comply with ASTM C 926.

1. Do not deviate more than plus or minus 1/4 inch in 10 feet (6 mm in 3 m) from a true plane in finished plaster surfaces when measured by a 10-foot (3-m) straightedge placed on surface.
2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.

B. Bonding Compound: Apply on unit masonry and concrete substrates for direct application of plaster.

C. Walls; Base-Coat Mixes for Use over Metal Lath: For scratch and brown coats, for three-coat plasterwork with 3/4-inch (19-mm) total thickness, as follows:

1. Portland and masonry cement mixes.

D. Ceilings; Base-Coat Mixes for Use over Metal Lath: For scratch and brown coats, for three-coat plasterwork and having 1/2-inch (13-mm) total thickness, as follows:
1. Portland and masonry cement mixes.

E. Walls; Base-Coat Mix: For base (scratch) coat, for two-coat plasterwork and having 3/8-inch (10-mm) thickness on masonry 1/4-inch (6-mm) thickness on concrete, as follows:
1. Portland and masonry cement mix.

F. Ceilings; Base-Coat Mix: For base (scratch) coat, for two-coat plasterwork and having 1/4-inch (6-mm) thickness on concrete, as follows:
1. Portland and masonry cement mix.

G. Plaster Finish Coats: Apply to provide float fine-textured finish to match Architect's sample.

H. Concealed Exterior Plasterwork: Where plaster application is used as a base for adhered finishes, omit finish coat.

I. Concealed Interior Plasterwork:

1. Where plaster application is concealed behind built-in cabinets, similar furnishings, and equipment, apply finish coat.
2. Where plaster application is concealed above suspended ceilings and in similar locations, omit finish coat.
3. Where plaster application is used as a base for adhesive application of tile and similar finishes, omit finish coat.

3.7 PLASTER REPAIRS

A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

3.8 CLEANING AND PROTECTION

A. Remove temporary protection and enclosure of other work after plastering is complete. Promptly remove plaster from door frames, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

END OF SECTION 092400

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Exterior gypsum board for ceilings and soffits.
3. Tile backing panels.
4. Texture finishes.

B. Related Requirements:

1. Section 061600 "Sheathing" for gypsum sheathing for exterior walls.
2. Section 079219 "Acoustical Joint Sealants" for acoustical joint sealants installed in gypsum board assemblies.
3. Section 092116.23 "Gypsum Board Shaft Wall Assemblies" for metal shaft-wall framing, gypsum shaft liners, and other components of shaft-wall assemblies.
4. Section 092216 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.
5. Section 092613 "Gypsum Veneer Plastering" for gypsum base for veneer plaster and for other components of gypsum-veneer-plaster finishes.
6. Section 093013 "Ceramic Tiling" for cementitious backer units installed as substrates for ceramic tile.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Gypsum wallboard.
2. Gypsum board, Type X.
3. Flexible gypsum board.
4. Gypsum ceiling board.
5. Foil-backed gypsum board.
6. Abuse-resistant gypsum board.
7. Impact-resistant gypsum board.
8. Mold-resistant gypsum board.
9. Gypsum board, Type C.
10. Glass-mat interior gypsum board.
11. Acoustically enhanced gypsum board.
12. Exterior gypsum soffit board.
13. Glass-mat gypsum sheathing board.
14. Glass-mat, water-resistant backing board.
15. Cementitious backer units.
16. Interior trim.

17. Exterior trim.
18. Aluminum trim.
19. Joint treatment materials.
20. Sound-attenuation blankets.
21. Acoustical sealant.
22. Textured finishes.

B. Samples: For the following products:
   1. Textured Finishes: 12”x12” for each textured finish indicated and on same backing indicated for Work.

C. Samples for Initial Selection: For each type of textured finish indicated.

D. Samples for Verification: For the following products:
   1. Textured Finishes: 12”x12” for each textured finish indicated and on same backing indicated for Work.

1.3 QUALITY ASSURANCE

A. Mockups: Build mockups of at least 100 sq. ft. (9 sq. m) in surface area to demonstrate aesthetic effects and to set quality standards for materials and execution.

   1. Build mockups 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 C840 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 E119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

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. Gypsum Wallboard: ASTM C1396/C1396M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. American Gypsum.
    b. CertainTeed LLC; Saint-Gobain North America.
    c. Continental Building Products, LLC.
    d. Georgia-Pacific Gypsum LLC.
    e. National Gypsum Company.
    f. USG Corporation.
2. Thickness: 5/8 inch (15.9 mm).
3. Long Edges: Tapered.

B. Gypsum Board, Type X: ASTM C1396/C1396M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. American Gypsum.
    b. CertainTeed LLC; Saint-Gobain North America.
    c. Continental Building Products, LLC.
    d. Georgia-Pacific Gypsum LLC.
    e. National Gypsum Company.

f. USG Corporation.

2. Thickness: 5/8 inch (15.9 mm).
3. Long Edges: Tapered.

C. Flexible Gypsum Board: ASTM C1396/C1396M. Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed LLC; Saint-Gobain North America.
b. Continental Building Products, LLC.
c. Georgia-Pacific Gypsum LLC.
d. National Gypsum Company.
e. USG Corporation.

2. Thickness: 1/4 inch (6.4 mm).
3. Long Edges: Tapered.

D. Gypsum Ceiling Board: ASTM C1396/C1396M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Gypsum.
b. CertainTeed LLC; Saint-Gobain North America.
c. Continental Building Products, LLC.
d. Georgia-Pacific Gypsum LLC.
e. National Gypsum Company.
f. USG Corporation.

2. Thickness: 1/2 inch (12.7 mm).
3. Long Edges: Tapered.

E. Abuse-Resistant Gypsum Board: ASTM C1396/C1396M gypsum board, tested according to ASTM C1629/C1629M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Gypsum.
b. CertainTeed LLC; Saint-Gobain North America.
c. Continental Building Products, LLC.
d. Georgia-Pacific Gypsum LLC.
e. National Gypsum Company.
f. USG Corporation.

2. Core: 5/8 inch (15.9 mm), Type X.
3. Surface Abrasion: ASTM C1629/C1629M, meets or exceeds Level 2 requirements.
4. Indentation: ASTM C1629/C1629M, meets or exceeds Level 2 requirements.

5. Soft-Body Impact: ASTM C1629/C1629M, meets or exceeds Level 2 requirements.
6. Long Edges: Tapered.
7. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

F. Impact-Resistant Gypsum Board: ASTM C1396/C1396M gypsum board, tested according to ASTM C1629/C1629M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. American Gypsum.
   b. CertainTeed LLC; Saint-Gobain North America.
   c. Continental Building Products, LLC.
   d. Georgia-Pacific Gypsum LLC.
   e. National Gypsum Company.
   f. USG Corporation.

2. Core: 5/8 inch (15.9 mm), Type X.
3. Surface Abrasion: ASTM C1629/C1629M, meets or exceeds Level 2 requirements.
4. Indentation: ASTM C1629/C1629M, meets or exceeds Level 2 requirements.
5. Soft-Body Impact: ASTM C1629/C1629M, meets or exceeds Level 2 requirements.
6. Hard-Body Impact: ASTM C1629/C1629M, meets or exceeds Level 2 requirements according to test in Annex A1.
7. Long Edges: Tapered.
8. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

G. Mold-Resistant Gypsum Board: ASTM C1396/C1396M. With moisture- and mold-resistant core and paper surfaces.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. American Gypsum.
   b. CertainTeed LLC; Saint-Gobain North America.
   c. Continental Building Products, LLC.
   d. Georgia-Pacific Gypsum LLC.
   e. National Gypsum Company.
   f. USG Corporation.

2. Core: 5/8 inch (15.9 mm), Type X.
3. Long Edges: Tapered.
4. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.4 SPECIALTY GYPSUM BOARD

A. Gypsum Board, Type C: ASTM C1396/C1396M. Manufactured to have increased fire-resistive capability.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Gypsum.
b. CertainTeed LLC; Saint-Gobain North America.
c. Continental Building Products, LLC.
d. Georgia-Pacific Gypsum LLC.
e. National Gypsum Company.
f. USG Corporation.

2. Thickness: As required by fire-resistance-rated assembly indicated on Drawings.
3. Long Edges: Tapered.

B. Glass-Mat Interior Gypsum Board: ASTM C1658/C1658M. With fiberglass mat laminated to both sides. Specifically designed for interior use.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Continental Building Products, LLC.
b. Georgia-Pacific Gypsum LLC.
c. National Gypsum Company.
d. USG Corporation.

2. Core: As indicated.
3. Long Edges: Tapered.
4. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

C. Acoustically Enhanced Gypsum Board: ASTM C1766. Multilayer products constructed of two layers of gypsum boards sandwiching a viscoelastic sound-absorbing polymer core.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed LLC; Saint-Gobain North America.
b. National Gypsum Company.
c. PABCO Gypsum.

2. Core: 5/8 inch (15.9 mm), Type X.
3. Long Edges: Tapered.

2.5 EXTERIOR GYPSUM BOARD FOR CEILINGS AND SOFFITS

A. Exterior Gypsum Soffit Board: ASTM C1396/C1396M, with manufacturer's standard edges.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Gypsum.
b. CertainTeed LLC; Saint-Gobain North America.
c. Continental Building Products, LLC.
d. Georgia-Pacific Gypsum LLC.
e. USG Corporation.

2. Core: As indicated.

B. Glass-Mat Gypsum Sheathing Board: ASTM C1177/C1177M, with fiberglass mat laminated to both sides and with manufacturer's standard edges.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Gypsum.
b. CertainTeed LLC; Saint-Gobain North America.
c. Continental Building Products, LLC.
d. Georgia-Pacific Gypsum LLC.
e. National Gypsum Company.
f. USG Corporation.

2. Core: 5/8 inch (15.9 mm), Type X.

2.6 TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Board: ASTM C1178/C1178M, with manufacturer's standard edges.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed LLC; Saint-Gobain North America.
b. Georgia-Pacific Gypsum LLC.
c. National Gypsum Company.
d. USG Corporation.

2. Core: 5/8 inch (15.9 mm), Type X.
3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

B. Cementitious Backer Units: ANSI A118.9 and ASTM C1288 or ASTM C1325, with manufacturer's standard edges.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed LLC; Saint-Gobain North America.
b. James Hardie Building Products, Inc.
c. National Gypsum Company.
d. USG Corporation.

2. Thickness: 1/2 inch (12.7 mm) or 5/8 inch (15.9 mm) as indicated.
3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.7 TRIM ACCESSORIES

A. Interior Trim: ASTM C1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
2. Shapes:

    a. Cornerbead.
    b. Bullnose bead.
    c. LC-Bead: J-shaped; exposed long flange receives joint compound.
    d. L-Bead: L-shaped; exposed long flange receives joint compound.
    e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
    f. Expansion (control) joint.

B. Exterior Trim: ASTM C1047.

1. Material: Hot-dip galvanized-steel sheet, plastic, or rolled zinc.
2. Shapes:

    a. Cornerbead.
    b. LC-Bead: J-shaped; exposed long flange receives joint compound.
    c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.

C. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

    a. Fry Reglet Corporation.

2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B221 (ASTM B221M), Alloy 6063-T5.
3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

2.8 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C475/C475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Exterior Gypsum Soffit Board: Paper.
3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
4. Tile Backing Panels: As recommended by panel 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.

    a. Use setting-type compound for installing paper-faced metal trim accessories.

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 high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.

D. Joint Compound for Exterior Applications:

1. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound.
2. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.

E. Joint Compound for Tile Backing Panels:

1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
2. Cementitious Backer Units: As recommended by backer unit manufacturer.
3. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.

2.9 AUXILIARY MATERIALS

A. 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.

C. Steel Drill Screws: ASTM C1002 unless otherwise indicated.

1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound-Attenuation Blankets: ASTM C665, 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.

E. Acoustical Sealant: As specified in Section 079219 "Acoustical Joint Sealants."

F. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

G. Vapor Retarder: As specified in Section 072600 "Vapor Retarders."

2.10 TEXTURE FINISHES

A. Primer: As recommended by textured finish manufacturer.

B. Aggregate Finish: Water-based, job-mixed, aggregated, drying-type texture finish for spray application.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed LLC; Saint-Gobain North America.
b. Georgia-Pacific Gypsum LLC.
c. National Gypsum Company.
d. USG Corporation.

2. Texture: Spatter knock-down.

C. Non-Aggregate Finish: Premixed, vinyl texture finish for spray application.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed LLC; Saint-Gobain North America.
b. National Gypsum Company.
c. USG Corporation.

2. Texture: Orange peel.

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 INSTALLATION AND FINISHING OF PANELS, GENERAL

A. Comply with ASTM C840.

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 (1.5 mm) 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. (0.7 sq. m) 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- (6.4- to 9.5-mm-) wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) 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. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.

J. 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 C919 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.

K. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 INSTALLATION OF INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Wallboard Type: Vertical surfaces unless otherwise indicated.
2. Type X: Where required for fire-resistance-rated assembly.
3. Flexible Type: Apply in double layer at curved assemblies.
4. Ceiling Type: Ceiling surfaces.
5. Abuse-Resistant Type: As indicated on Drawings.
6. Impact-Resistant Type: As indicated on Drawings.

7. Mold-Resistant Type: All bathroom and locker room walls and ceilings except behind tile.
8. Type C: Where required for specific fire-resistance-rated assembly indicated.
9. Glass-Mat Interior Type: At rated tile shower walls where local AHJ will not allow cementitious backer panel transitions, service kitchens, central laundry and any service rooms with doors leading directly to the exterior.
10. Acoustically Enhanced Type: As indicated on Drawings.

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 (400 mm) 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. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written instructions and temporarily brace or fasten gypsum panels until fastening adhesive has set.

E. Curved Surfaces:

1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch- (300-mm-) 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 (400 mm) o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches (300 mm) o.c.

3.4 INSTALLATION OF EXTERIOR GYPSUM PANELS FOR CEILINGS AND SOFFITS

A. Apply panels perpendicular to supports, with end joints staggered and located over supports.

1. Install with 1/4-inch (6.4-mm) open space where panels abut other construction or structural penetrations.
2. Fasten with corrosion-resistant screws.

3.5 INSTALLATION OF TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions and install at locations indicated to receive tile where local AHJ will not allow cementitious backer panel transitions. Install with 1/4-inch (6.4-mm) gap where panels abut other construction or penetrations.

B. Cementitious Backer Units: ANSI A108.11, at locations indicated to receive tile.

C. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.6 INSTALLATION OF 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 at locations indicated on Drawings and according to ASTM C840 and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners unless otherwise indicated.
2. Bullnose Bead: Use where indicated.
3. LC-Bead: Use at exposed panel edges.
4. L-Bead: Use at all connections to different materials which will be exposed to view.
5. U-Bead: Use at exposed panel edges.
6. Curved-Edge Cornerbead: Use at curved openings.

D. Exterior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.
2. LC-Bead: Use at exposed panel edges.

E. Aluminum Trim: Install in locations indicated on Drawings or specialty conditions.

3.7 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 C840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Panels that are substrate for tile, panels that are substrate for acoustical tile and where indicated on Drawings.
3. Level 3: At heavy textured surfaces only as noted on drawings or approved by Architect.
4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.

    a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

5. Level 5: Where indicated on Drawings, any curved drywall surfaces or surfaces receiving eggshell or greater sheen paint.

    a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

E. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.

F. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.

G. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.8 INSTALLATION OF TEXTURE FINISHES

A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.

B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.

C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite

these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written instructions.

3.9 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

SECTION 093000
TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS: drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

. This Section includes:
1. Quarry tile where scheduled.
2. Glazed wall tile where scheduled.
3. Un-glazed floor tile where scheduled
4. Marble thresholds at doorways into rooms with quarry or ceramic tile flooring.
5. Synthetic Polymer interior window sills located on exterior walls
6. Waterproof shower receptor membranes

1.3 SUBMITTALS

A. General: submit the following per Conditions of Contract and Division 1 Specification Sections.
B. Product data for each type of product specified.
C. Shop drawings indicating tile patterns and locations and widths of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces. Precisely locate each joint and crack in tile substrates by measuring then record measurements on shop drawings, coordinating measurements with tile joint locations, and consult with Interior Designer.
D. Samples for initial selection purposes per manufacturer color charts consisting of actual tiles or tile sections showing full range of colors, textures, and patterns available for each type and composition of tile indicated. Include grout and accessories samples involving color selection.
E. Samples for verification purposes of each item listed below, prepared on samples of size and construction indicated, products involve color and texture variations, in sets showing full range of variations expected.
1. Each type and composition of tile and for each color and texture required, 12” square minimum, mounted on plywood or hardboard backing and grouted.
2. Full size units of each type of trim and accessory for each color required.
3. Stone thresholds in 6” lengths.
4. Metal edge strips in 6” lengths.
F. Master grade certificates for each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
G. Material test reports from qualified independent testing laboratory indicating/interpreting test results relative to compliance of tile and tile setting and grouting products with requirements indicated.
H. Qualification data for firms/persons specified in "Quality Assurance" article demonstrating their capabilities and experience. Include list of completed projects (project names, addresses, Architects, Interior Designer and Owner), plus other information specified.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility for Tile: obtain each color, grade, finish, type, composition, and variety of tile from single source with resources providing products of consistent quality in appearance and

physical properties without delaying progress of the Work.

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

C. Installer Qualifications: engage experienced Installer who has successfully completed tile installations similar in material, design, and extent to that indicated for Project.

1.5 DELIVERY, STORAGE, & HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement of ANSI A-137.1 for labeling sealed tile packages.

B. Prevent damage/contamination to materials by water, freezing, foreign matter, and other causes.

C. Handle tile with temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If despite these precautions coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.6 PROJECT CONDITIONS

A. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.

B. Vent temporary heaters to exterior to prevent damage to tile work from carbon dioxide buildup.

C. Maintain temperatures at 50 degrees F in tiled areas during installation and for 7 days after completion, unless higher temperatures required by referenced installation standard or manufacturer instructions.

1.7 EXTRA MATERIALS: Deliver extra materials to Owner. Furnish extra materials matching installed products as described, packaged with protective covering for storage and identified with labels clearly describing contents. Tile and Trim Units: furnish quantity of full size units equal to 3% of amount installed, for each type, composition, color, pattern, and size.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

C. Available Manufacturers: subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work, provide products by:

1. Quarry Tile:
   a. American Olean Tile Co., Inc.
   b. Buchtal Corp. USA
   c. Dal-Tile Corp.
   d. Mid-State Tile Co.
   e. Summitville Tiles, Inc.

2. Glazed Wall Tile and un-glazed floor tile
   a. American Olean Tile Co., Inc.
   b. Buchtal Corp. USA
   c. Dal-Tile Corp.
   d. Mid-State Tile Co.
   e. Summitville Tiles, Inc.

3. Chemical Resistant Water Cleanable Ceramic Tile Setting Epoxy Mortars:
   a. American Olean Tile Co., Inc.
   b. Atlas Minerals & Chemicals, Inc.
   c. Bostik Construction Products Div.
   d. C-Cure Chemical Co.
   e. L & M Mfg. Inc.
   f. Southern Grouts & Mortars, Inc.
   g. Summitville Tiles, Inc.

4. Commercial Portland Cement Grouts:
   a. American Olean Tile Co., Inc.
   b. Bostik Construction Products Div.
   c. Custom Building Products
   d. C-Cure Chemical Co.
   e. L & M Mfg. Inc.
   f. Southern Grouts & Mortars, Inc.

5. Solid Synthetic Polymer Window Sills:
   a. DuPont Polymers.
   b. Formica Corporation.
   c. Nevamar; International Paper; Decorative Products Division.
   d. Swan Corporation.
   e. Wilsonart International; Div. of Premark International, Inc.
   f. Avonite Inc.

6. Waterproof Shower Pan Membranes:
   a. Fabric reinforced self-adhering, modified bituminous sheet product by National Applied Construction Products or approved equal manufacturer

2.2 PRODUCTS, GENERAL

A. ANSI Standard for Ceramic Tile: per ANSI A-137.1 "American National Standard Specifications for Ceramic Tile" indicated tile types, compositions, & grades. Furnish per "Standard Grade" requirements.
B. ANSI Standard for Tile Installation Materials: per ANSI standard referenced with products and materials indicated for setting and grouting.
C. Colors, Textures, and Patterns: manufacturer standard products indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with selections made by Interior Designers from manufacturer full range of standard colors, textures, and patterns for products of type indicated.
D. Factory Applied Temporary Protective Coating: indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by pre-coating them with a continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

2.3 TILE PRODUCTS

A. Glazed Quarry Tile: provide square edged flat tile complying with:
   1. Wearing Surface: nonabrasive.
   2. Nominal Facial Dimensions: 8” x 8”

3. Face: plain.

B. Glazed wall tile and un-glazed floor tile: provide flat tile per indicated nominal facial dimensions.

C. Trim Units: provide tile trim units to match characteristics of adjoining flat tile and complying with:
   1. Size: as indicated/coordinated with sizes and coursing of adjoining flat tile where applicable.
   2. Shapes: as follows, selected from manufacturer standard shapes:
      a. All tile bases shall be coved.
      b. All wainscot caps and external corners shall be bullnose type.
      c. Internal Corners: field butted square corners, except use coved base and cap angle pieces designed to member with stretcher shapes.

2.4 STONE THRESHOLDS

A. Provide Marble thresholds at all locations where tile work terminates at doorways or cased openings. Threshold height ½" maximum above adjoining floor surfaces, with transition edges beveled on a 1:2 maximum slope.

B. Material: white, honed marble complying with Marble Institute of America, grade "A" requirements for hardness, unless otherwise indicated on the I.D Documents.

2.5 WATERPROOFING FOR THINSET TILE INSTALLATIONS

A. Urethane Waterproofing and Tile Setting Adhesive: manufacturer standard proprietary product consisting of 1-part liquid applied urethane in suitable consistency for trowel application and intended for use as both waterproofing and tile setting adhesive in a 2-step process.

B. Available Products: subject to compliance with requirements, products which may be incorporated in the Work include, but are not limited to urethane waterproofing and tile setting adhesive: "Hydroment Ultra-Set"; Bostik Construction Products Div.

2.6 SETTING MATERIALS

A. Portland cement Mortar Installation Materials: provide materials per ANSI A108.1 and as specified:
   1. Cleavage Membrane: asphalt felt, ASTM D-226 Type I (No. 15), or polyethylene sheeting ASTM D-4397, 4.0 mils thick.
   2. Reinforcing Wire Fabric: galvanized welded wire fabric, 2" x 2" - WO.3 by WO.3 (16 ASW gage or 0.0625" diameter); per ASTM A-185 and ASTM A-82 except for minimum wire size.
   3. Expanded Metal Lath: provide diamond mesh lath per ASTM C-847 for indicated requirements:
      a. Base Metal and Finish for Interior Applications: fabricate lath from uncoated or zinc coated (galvanized) steel sheet, with uncoated steel sheet painted after fabrication into lath.
      b. Base Metal and Finish for Exterior Applications: fabricate lath from zinc coated (galvanized) steel sheet.
      c. Configuration over Studs and Furring: flat.
      d. Configuration over Solid Surfaces: self-furring.
      e. Weight: 3.4 psf.
   3. Latex additive (water emulsion) described below, serving as replacement for part/all gauging water, of type specifically recommended by latex additive manufacturer used with job mixed Portland cement and aggregate mortar bed. Latex additive:
      a. Manufacturer standard.
      b. Styrene butadiene rubber.
      c. Acrylic resin.

B. Latex Portland cement Mortar: ANSI A-118.4, composition as follows:
   1. Prepackaged dry mortar mix composed of Portland cement, graded aggregate, and the dry polymer additive in form of a re-emulsifiable powder to which only water added at job site.
   2. Latex additive (water emulsion), serving as replacement for part/all gauging water, combined at job site with prepackaged dry mortar mix supplied/ specified by latex additive manufacturer.

2.7 GROUTING MATERIALS: commercial Portland cement grout: ANSI A-118.6, color as indicated.

2.8 ELASTOMERIC SEALANTS

B. General: provide manufacturer standard chemically curing, elastomeric sealant of base polymer indicated complying with Division 7 Section "Joint Sealants," including ASTM C-920 as referenced by Type, Grade, Class, and Uses.

C. Colors: exposed sealant colors matching grout colors in tile adjoining sealed joints unless otherwise noted.

D. 1-Part Mildew Resistant Silicone Sealant: Type S Grade NS; Class 25; Uses NT, G, A, and as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates subject to in service exposures of high humidity and temperature extremes.

E. Available Products: subject to compliance with requirements, products which may be incorporated in the Work include:
   1. 1-Part Mildew Resistant Silicone Sealant:
      c. "Dow Corning 786"; Dow Corning Corp.
      d. "SCS 1702"; General Electric Co.
      e. "863 #345 White"; Pecora Corp.
      f. "Rhodorsil 6B White"; Rhone-Poulenc Inc.
      g. "Proglaze White"; Tremco Corp.

E. All grout and tile to be sealed.

2.9 MISCELLANEOUS MATERIALS

A. Temporary Protective Coating: provide product indicated formulated to protect exposed tile surfaces against mortar and grout adherence, compatible with tile & mortar/grout products, & easily removable after grouting completed without damaging grout or tile.
   1. Petroleum paraffin wax, fully refined, tasteless, odorless, containing 0.5% min. oil with melting point of 120 degrees F to 140 degrees F per ASTM D-87.
   2. Grout release in form of manufacturer standard proprietary liquid coating specially formulated and recommended for use as a temporary protective coating for tile.

2.10 MIXING MORTARS & GROUT: mix mortars and grouts per referenced standards and manufacturer requirements; including those for accurate proportioning of materials, water, or additive content; type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortars and grouts of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. With Installer present, examine substrates/areas where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile. Verify:
   1. Substrates for setting tile are firm, dry, clean, and free from oil or waxy films and curing compounds.
   2. Installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

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

B. Field Applied Temporary Protective Coating: where indicated under tile type or needed to prevent adhesion or staining of exposed tile surfaces by grout, protect exposed surfaces of tile against adherence of mortar and grout by pre-coating with continuous film of temporary protective coating indicated below, taking care not to coat unexposed tile surfaces:
   1. Petroleum paraffin wax, applied hot.
   2. Grout release.
   3. Petroleum paraffin wax or grout release.

3.3 INSTALLATION, GENERAL

A. ANSI Tile Installation Standard: comply with parts of ANSI 108 series of tile installation standards included under "American National Standard Specifications for the Installation of Ceramic Tile" which apply to type of setting/grouting materials and methods indicated.

B. TCA Installation Guidelines: "Handbook for Ceramic Tile Installation" comply with noted installation methods.

C. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions except as otherwise shown. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

D. 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 that plates, collars, or covers overlap tile.

E. Jointing Pattern: lay tile in grid pattern and align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths unless otherwise shown. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so that extent of each sheet is not apparent in finished work.

F. Lay out tile wainscots to next full tile beyond dimensions indicated.

G. Expansion Joints: locate expansion joints and sealant filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw cut joints after installation of tiles.

H. Grout tile to comply with the requirements of the following installation standards:

1. Ceramic tile grouts (sand Portland cement, dry set, commercial Portland cement, and latex Portland cement grouts), comply with ANSI A108.10.
2. Chemical resistant epoxy grouts, comply with ANSI A108.6.
3. Chemical resistant furan grouts, comply with ANSI A108.8.

I. At showers, tubs and similar wet areas, install cementitious backer units and treat joints to comply with manufacturer's instructions for type of application indicated.

3.4 WATERPROOFING FOR THINSET TILE INSTALLATIONS

A. Install waterproofing per waterproofing manufacturer instructions producing a waterproof membrane of uniform thickness bonded securely to substrate.
B. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.5 FLOOR INSTALLATION METHODS

A. Quarry Tile: unless otherwise indicated on I.D. Documents, install tile complying with requirements indicated below for setting bed method, TCA installation method related to type of construction, and grout type:
   1 Portland Cement Mortar: ANSI A-108.1.
   2. Bond Coat: Portland cement paste or dust coat on plastic bed.
   3. Concrete Subfloor, Interior: TCA F112 (bonded).
   4. Grout: commercial Portland cement.
B. Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.

3.6 WALL TILE INSTALLATION METHODS

A. Unless otherwise indicated on I. D. Documents, install tile types designated for wall application complying with requirements indicated below for setting bed methods, TCA installation methods related to subsurface wall conditions, and grout types:
   1 Portland Cement Mortar: ANSI A-108.1.
      a. Masonry or Concrete, Interior: TCA W211 (bonded).
      b. Solid Backing, Interior: TCA W222 (1-coat method).
      b. Metal Studs, Interior: TCA W241.
      d. Bathtub Walls, Metal or Wood Studs: TCA B411.
      c. Shower Receptors, Metal or Wood Studs: TCA B416.
      d. Grout: commercial Portland cement.

3.7 CLEANING & PROTECTION

A. Cleaning: Upon completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
   1 Remove latex Portland cement grout residue from tile as soon as possible.
   2 Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's printed instructions, but no sooner than 14 days after installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.
   3 Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to brick and grout manufacturer. Trap and remove coating to prevent it from clogging

drains.

B. Finished Tile Work: leave finished installation clean and free of cracked, chipped, broken, un-bonded, and otherwise defective tile work.
C. Provide final protection/maintain conditions in manner acceptable to manufacturer and installer ensuring tile is without damage or deterioration at time of Substantial Completion.
D. Seal all grout and tile.

3.8 FLOOR & WALL TILE SCHEDULE: all tile selections will be as indicated on Interior Designer's finish schedule.

END OF SECTION 093000

SECTION 095123 - ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Acoustical tiles for interior ceilings.
2. Fully concealed, direct-hung, suspension systems.
3. Direct attachment of tiles to substrates with adhesive.
4. Direct attachment of tiles to substrates with staples.

B. Related Requirements:

1. Section 095113 "Acoustical Panel Ceilings" for ceilings consisting of mineral-base and glass-fiber-base acoustical panels and exposed suspension systems.
2. Section 095133 "Acoustical Metal Pan Ceilings" for ceilings consisting of metal-pan units with exposed and concealed suspension systems.

C. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

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, 6 inches (150 mm) in size.

C. Samples for Initial Selection: For components with factory-applied finishes.

D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:

1. Acoustical Tiles: Set of full-size Samples of each type, color, pattern, and texture.
2. Concealed Suspension-System Members: 6-inch- (150-mm-) long Sample of each type.
3. Exposed Moldings and Trim: Set of 6-inch- (150-mm-) long Samples of each type and color.
4. Seismic Clips: Full size.

E. Delegated-Design Submittal: For seismic restraints for ceiling systems.

1. Include design calculations for seismic restraints including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

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. Ceiling suspension-system members.
2. Structural members to which suspension systems will be attached.
3. Method of attaching hangers to building structure.
4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.
5. Size and location of initial access modules for acoustical tile.
6. Items penetrating finished ceiling and ceiling-mounted items including the following:
    a. Lighting fixtures.
    b. Diffusers.
    c. Grilles.
    d. Speakers.
    e. Sprinklers.
    f. Access panels.
    g. Perimeter moldings.
7. Show operation of hinged and sliding components adjacent to acoustical tiles.
8. Minimum Drawing Scale: 1/8 inch = 1 foot (1:96).

B. Qualification Data: For testing agency.

C. Product Test Reports: For each acoustical tile ceiling, for tests performed by a qualified testing agency.

D. Evaluation Reports: For each acoustical tile ceiling suspension system and anchor and fastener type, from ICC-ES.

E. 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, 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. Acoustical Ceiling Units: Full-size tiles equal to 2 percent of quantity installed.

2. Suspension-System Components: Quantity of each concealed grid and exposed component equal to 2 percent of quantity installed.

1.7 QUALITY ASSURANCE

A. 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 ceiling 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.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical tiles, suspension-system components, and accessories to Project site 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 tiles, permit them to reach room temperature and a stabilized moisture content.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weathertight, 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 tile ceiling installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations:

1. Suspended Acoustical Tile Ceilings: Obtain each type of acoustical ceiling tile and its suspension system from single source from single manufacturer.
2. Directly Attached Acoustical Tile Ceilings: Obtain each type of acoustical ceiling tile from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design seismic restraints for ceiling systems.

B. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

C. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Class A according to ASTM E1264.
2. Smoke-Developed Index: 50 or less.

D. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL or from the listings of another qualified testing agency.

2.3 ACOUSTICAL TILES ACT-1 (Front of House)

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Armstrong World Industries, Inc.
2. Certainteed; SAINT-GOBAIN.
3. Rockfon, ROXUL Inc.
4. USG Corporation.

B. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E1264 classifications as designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.

C. Classification: Provide tiles as follows:
1. Type: Type XX.
2. Pattern: E (lightly textured) or G (smooth).
3. Fire Class: Class A.

D. Color: White.

E. Light Reflectance (LR): Not less than 0.80.

F. Noise Reduction Coefficient (NRC): Not less than 0.70.

G. Edge/Joint Detail: Square, kerfed, and rabbeted; tongue and grooved; or butt.

H. Thickness: 5/8 inch (15 mm).

I. Modular Size: As indicated on Drawings and Schedule.

J. Antimicrobial Treatment: Manufacturer's standard broad spectrum, 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 D3273, ASTM D3274, or ASTM G21 and evaluated according to ASTM D3274 or ASTM G21.

2.4 ACOUSTICAL TILES ACT-2 (Washable/Service)

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Armstrong World Industries, Inc.
2. Certainteed; SAINT-GOBAIN.
3. Rockfon, ROXUL Inc.
4. USG Corporation.

B. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E1264 classifications as designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.

C. Classification: Provide tiles as follows:
1. Type: Type XX.
2. Pattern: E (lightly textured).
3. Fire Class: Class A.

D. Color: White.

E. Light Reflectance (LR): Not less than 0.80.

F. Noise Reduction Coefficient (NRC): Not less than 0.70.

G. Edge/Joint Detail: Square, kerfed, and rabbeted; tongue and grooved; or butt.

H. Thickness: 3/4 inch (19 mm).

I. Modular Size: As indicated on Drawings and Schedule.

J. Antimicrobial Treatment: Manufacturer's standard broad spectrum, 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 D3273, ASTM D3274, or ASTM G21 and evaluated according to ASTM D3274 or ASTM G21.

2.5 ACOUSTICAL TILES ACT-3 (Back of House)

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Armstrong World Industries, Inc.
2. Certainteed; SAINT-GOBAIN.
3. Rockfon, ROXUL Inc.
4. USG Corporation.

B. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E1264 classifications as designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.

C. Classification: Provide tiles as follows:

1. Type: Type III, mineral base with painted finish or Type XX.
2. Pattern: C (perforated, small holes), CD (perforated, small holes and fissured), CE (perforated, small holes and lightly textured), D (fissured) or E (lightly textured).
3. Fire Class: Class A.

D. Color: White.

E. Light Reflectance (LR): Not less than 0.80.

F. Noise Reduction Coefficient (NRC): Not less than 0.70.

G. Edge/Joint Detail: Square, kerfed, and rabbeted; tongue and grooved; or butt.

H. Thickness: 5/8 inch (15 mm).

I. Modular Size: As indicated on Drawings and Schedule.

J. Antimicrobial Treatment: Manufacturer's standard broad spectrum, 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 D3273, ASTM D3274, or ASTM G21 and evaluated according to ASTM D3274 or ASTM G21.

2.6 METAL SUSPENSION SYSTEM

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Armstrong Ceiling & Wall Solutions.
2. Rockfon, ROXUL Inc.
3. USG Corporation.

B. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, fully concealed, metal suspension system and accessories of type, structural classification, and finish indicated that complies with applicable requirements in ASTM C635/C635M.

1. High-Humidity Finish: Where indicated, provide coating tested and classified for "severe environment performance" according to ASTM C635/C635M.
   a. Provide aluminum system in Service Kitchens, Soiled Rooms and Laundry Rooms.

2.7 ACCESSORIES

A. Attachment Devices: Size for five times the design load indicated in ASTM C635/C635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

1. 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 E1190, conducted by a qualified testing and inspecting agency.

B. Wire Hangers, Braces, and Ties: Provide wires as follows:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper.
2. Stainless-Steel Wire: ASTM A580/A580M, Type 304, nonmagnetic.
3. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C635/C635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.106-inch- (2.69-mm-) diameter wire.

C. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

D. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.

E. Angle Hangers: Angles with legs not less than 7/8 inch (22 mm) wide; formed with 0.04-inch- (1-mm-) thick, galvanized-steel sheet complying with ASTM A653/A653M, G90 (Z275) coating designation; with bolted connections and 5/16-inch- (8-mm-) diameter bolts.

F. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.

G. Seismic Struts: Manufacturer's standard compression struts designed to accommodate lateral forces.

H. Seismic Clips: Manufacturer's standard seismic clips designed to secure acoustical tiles in-place during a seismic event.

2.8 METAL EDGE MOLDINGS AND TRIM

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Armstrong World Industries, Inc.
2. Certainteed; SAINT-GOBAIN.
3. Fry Reglet Corporation.
4. Rockfon (Rockwool International).
5. USG Corporation.

B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations complying with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for of suspension-system runners.

1. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

2. Finish: Painted white.

C. Extruded-Aluminum Edge Moldings and Trim: Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements.
1. Baked-Enamel or Powder-Coat Finish: Minimum dry film thickness of 1.5 mils (0.04 mm). Comply with ASTM C635/C635M and coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

2.9 ACOUSTICAL SEALANT

A. Acoustical Sealant: As specified in Section 079219 "Acoustical Joint Sealants."

2.10 MISCELLANEOUS MATERIALS

A. Acoustical Tile Adhesive: Type recommended in writing by acoustical tile manufacturer, bearing UL label for Class 0-25 flame spread.

B. Staples: 5/16-inch- (8-mm-) long, divergent-point staples.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine acoustical tiles before installation. Reject acoustical tiles that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Testing Substrates: Before adhesively bonding tiles to wet-placed substrates such as cast-in-place concrete or plaster, test and verify that moisture level is below tile manufacturer's recommended limits.

B. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.

C. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION OF SUSPENDED ACOUSTICAL TILE CEILINGS

A. Install suspended acoustical tile ceilings according to ASTM C636/C636M, seismic design requirements, and manufacturer's written instructions.

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. 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.
3. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
4. 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.
5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
6. 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.
7. Do not attach hangers to steel deck tabs.
8. Do not attach hangers to steel roof deck. Attach hangers to structural members.
9. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.
10. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical tiles.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends. Miter corners accurately and connect securely.

3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Arrange directionally patterned acoustical tiles as follows:

1. As indicated on reflected ceiling plans.

G. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension-system flanges into kerfed edges of tiles so tile-to-tile joints are interlocked.

1. Fit adjoining tiles to form flush, tight joints. Scribe and cut tiles for accurate fit at borders and around penetrations through ceiling.
2. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tiles and moldings, spaced 12 inches (305 mm) o.c.
3. Protect lighting fixtures and air ducts according to requirements indicated for fire-resistance-rated assembly.

3.4 ERECTION TOLERANCES

A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet (3 mm in 3.6 m), non-cumulative.

B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3 mm in 3.6 m), non-cumulative.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:

1. Periodic inspection during the installation of suspended ceiling grids according to ASCE/SEI 7.

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

C. Perform the following tests and inspections of completed installations of acoustical tile ceiling hangers and anchors and fasteners in successive stages and when installation of ceiling suspension systems on each floor has reached 20 percent completion, but no tiles have been installed. Do not proceed with installations of acoustical tile ceiling hangers for the next area until test results for previously completed installations of acoustical tile ceiling hangers show compliance with requirements.

1. Within each test area, testing agency will select one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf (890 N) of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf (1957 N) of tension.

2. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.

D. Acoustical tile ceiling hangers, anchors, and fasteners will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

3.6 ADJUSTING

A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.

B. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095123

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Vinyl base.
   2. Vinyl molding accessories.

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, not less than 12 inches (300 mm) long.

C. Samples for Initial Selection: For each type of product indicated.

D. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches (300 mm) long.

E. Product Schedule: For resilient base and accessory products. Use same designations indicated on Drawings.

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. Furnish not less than 10 linear feet (3 linear m) for every 500 linear feet (150 linear m) or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

   1. Coordinate mockups in this Section with mockups specified in other Sections.

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. 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 (10 deg C) or more than 90 deg F (32 deg C).

1.7 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive resilient products during the following 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 (13 deg C) or more than 95 deg F (35 deg C).

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 VINYL BASE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Armstrong World Industries, Inc.
2. Johnsonite; a Tarkett company.
3. Mohawk.

B. Product Standard: ASTM F1861, Type TV (vinyl, thermoplastic).

1. Group: I (solid, homogeneous).
2. Style and Location:

a. Style A, Straight: Provide in areas with carpet.
b. Style B, Cove: Provide in areas with resilient floor coverings.

C. Minimum Thickness: 0.080 inch (2.0 mm).

D. Height: As indicated on Drawings.

E. Lengths: Coils in manufacturer's standard length.

F. Outside Corners: Job formed.

G. Inside Corners: Job formed.

H. Colors and Patterns: Match Architect's sample per Finish Schedule.

2.2 VINYL MOLDING ACCESSORY

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Armstrong World Industries, Inc.
2. Johnsonite; a Tarkett company.
3. Mohawk.

B. Description: Vinyl carpet edge for glue-down applications nosing for carpet nosing for resilient floor covering reducer strip for resilient floor covering joiner for tile and carpet transition strips.

C. Profile and Dimensions: As indicated.

D. Locations: Provide vinyl molding accessories in areas indicated.

E. Colors and Patterns: Match Architect's sample as indicated on Finish Schedule.

2.3 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 substrate conditions indicated.

C. Metal Edge Strips: Extruded aluminum with mill finish, nominal 2 inches (50.8 mm) wide, of height required to protect exposed edges of flooring, and in maximum available lengths to minimize running joints.

D. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient stair-tread 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 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. Concrete Substrates for Resilient Stair Accessories: Prepare horizontal surfaces according to ASTM F710.

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 manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by 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: Perform tests so that each test area does not exceed 1000 sq. ft. (304.8 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

    a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
    b. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient products until materials are the same temperature as space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

E. 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.

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 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 surfaces.
2. Sweep and vacuum horizontal surfaces thoroughly.
3. Damp-mop horizontal surfaces to remove marks and soil.

C. Protect resilient products from mars, 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 096723 - RESINOUS FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Resinous flooring.
2. Integral cove base accessories.

B. Related Sections:
1. Section 099123 "Interior Painting" for concrete floor sealer.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review manufacturer's written instructions for substrate preparation and environmental conditions affecting resinous flooring installation.
2. Review details of integral cove bases.
3. Review manufacturer's written instructions for installing resinous flooring systems.
4. Review protection measures for adjacent construction and installed flooring, floor drainage requirements, curbs, base details, and so forth.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's technical data, installation instructions, and recommendations for each resinous flooring component required.

B. Samples: For each resinous floor system required and for each color and texture specified, 6 inches (150 mm) square in size, applied to a rigid backing by Installer for this Project.

C. Samples for Initial Selection: For each type of exposed finish required.

D. Samples for Verification: For each resinous flooring system required and for each color and texture specified, 6 inches (150 mm) square, applied to a rigid backing by Installer for this Project.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Material Certificates: For each resinous flooring component.

C. Material Test Reports: For each resinous flooring system, by a qualified testing agency.

D. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For resinous flooring to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Apply full-thickness mockups on 96-inch- (2400-mm-) square floor area selected by Architect.

a. Include 96-inch (2400-mm) length of integral cove base with inside and outside corner.

2. Simulate finished lighting conditions for Architect's review of mockups.
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.

1.8 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 storage and mixing with other components.

1.9 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 installation.

B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring installation.

C. Close spaces to traffic during resinous flooring installation and for 24 hours after installation unless manufacturer recommends a longer period.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Flammability: Self-extinguishing in accordance with ASTM D635.

2.2 RESINOUS FLOORING

A. Resinous Flooring System: Abrasion-, impact-, and chemical-resistant, aggregate-filled, resin-based monolithic floor surfacing designed to produce a seamless floor and integral cove base.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Duraflex, Inc.
b. Nox-Crete Products Group.
c. Sika Corporation; Flooring.

B. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, from single source from single manufacturer. Obtain secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from manufacturer recommended in writing by manufacturer of primary materials.

C. System Characteristics:

1. Color and Pattern: As selected by Architect from manufacturer's full range.
2. Wearing Surface: Textured for slip resistance.
3. Overall System Thickness: 1/4 inch (6.4 mm).

D. System Physical Properties: Provide resinous flooring system with the following minimum physical property requirements when tested in accordance with test methods indicated:

1. Compressive Strength: 12,000 psi minimum in accordance with ASTM C579.
2. Tensile Strength: 4,000 psi minimum in accordance with ASTM C307.
3. Water Absorption: 0.04 percent maximum in accordance with ASTM C413.

4. Impact Resistance: No chipping, cracking, or delamination and not more than 1/16-inch (1.6-mm) permanent indentation in accordance with MIL-D-3134J.
5. Resistance to Elevated Temperature: No slip or flow of more than 1/16 inch (1.6 mm) in accordance with MIL-D-3134J.
6. Abrasion Resistance: 4 mg maximum weight loss in accordance with ASTM D4060.
7. Hardness: 75-80 D, Shore D in accordance with ASTM D2240.
8. Critical Radiant Flux: 0.45 W/sq. cm or greater in accordance with NFPA 253.

E. Primer: Type recommended in writing by resinous flooring manufacturer for substrate and resinous flooring system indicated.

F. Waterproofing Membrane: Type recommended in writing by resinous flooring manufacturer for substrate and resinous flooring system indicated.

G. Reinforcing Membrane: Flexible resin formulation that is recommended in writing by resinous flooring manufacturer for substrate and resinous flooring system indicated and that inhibits substrate cracks from reflecting through resinous flooring.

H. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended in writing by manufacturer for installation indicated.

I. Body Coats:

1. Products:

    a. Poly-crete SLB. (Basis of Design)

2. Resin: Urethane.
3. Formulation Description: 100 percent solids.
4. Type: Pigmented.
5. Installation Method: Self-leveling slurry with broadcast aggregates.
6. Number of Coats: One.
7. Thickness of Coats: 1/8 inch (3.2 mm).
8. Aggregates: Colored quartz (ceramic-coated silica).

J. Topcoat:

1. Products:

    a. Poly-crete Shop Floor. (Basis of Design)

2. Resin: Urethane.
3. Formulation Description: 100 percent solids.
4. Type: Pigmented.
5. Thickness of Coat: 16 mils (0.4 mm).

K. Topcoats: Sealing or finish coats.

1. Products:

    a. Poly-crete Armor-Top. (Basis of Design)

2. Resin: Urethane.
3. Formulation Description: 95 percent solids.
4. Type: Pigmented.
5. Number of Coats: Two.
6. Thickness of Coats: 4 mils (0.1 mm).
7. Finish: Gloss.

2.3 INTEGRAL COVE BASE ACCESSORIES

A. Precast, Integral Cove Base: Impact-resistant, polymer-resin, cove base moldings with a grit profile to promote adhesion of resinous flooring and recommended in writing by resinous flooring manufacturer.

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. SpeedCove, Inc.

2. Radius Cove Base: 8-inch (203 mm) high base molding that provides approximately 1-inch (25-mm) radius cove at floor-to-wall joint; for adhesive installation as substrate for resinous flooring system to form an integral cove base.

a. Preformed Inside and Outside Corners: Provide manufacturer's standard square inside and square outside corners.

B. Installation Adhesive: As recommended in writing by accessory 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 resinous flooring systems.

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

3.2 PREPARATION

A. Prepare and clean substrates in accordance with resinous flooring manufacturer's written instructions for substrate indicated to ensure adhesion.

B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with 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 requirements in SSPC-SP 13/NACE No. 6, with a Concrete Surface Profile of 3 or greater in accordance with ICRI Technical Guideline No. 310.2R, unless manufacturer's written instructions are more stringent.

2. Repair damaged and deteriorated concrete in accordance with resinous flooring manufacturer's written instructions.
3. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. (304.8 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

    a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
    b. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

4. Alkalinity and Adhesion Testing: Perform tests recommended in writing by resinous flooring manufacturer. Proceed with installation only after substrate alkalinity is not less than 6 or more than 8 pH unless otherwise recommended in writing by flooring manufacturer,

C. Patching and Filling: Use patching and fill material to fill holes and depressions in substrates in accordance with manufacturer's written instructions.

1. Control Joint Treatment: Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring in accordance with manufacturer's written instructions.

D. Resinous Materials: Mix components and prepare materials in accordance with resinous flooring manufacturer's written instructions.

3.3 INSTALLATION

A. Apply components of resinous flooring system in accordance with manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness specified.

1. Coordinate installation of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
2. Cure resinous flooring components in accordance with manufacturer's written instructions. Prevent contamination during installation and curing processes.
3. Expansion and Isolation Joint Treatment: At substrate expansion and isolation joints, comply with resinous flooring manufacturer's written instructions.

B. Primer: Apply primer over prepared substrate at spreading rate recommended in writing by manufacturer.

C. Reinforcing Membrane: Apply reinforcing membrane to substrate cracks.

D. Integral Cove Base Accessories: Adhesively install precast accessories before applying flooring coats and in accordance with manufacturer's written instructions.

E. Field-Formed Integral Cove Base: Apply cove base mix to wall surfaces before applying flooring coats. Apply in accordance with manufacturer's written instructions and details, including those for taping, mixing, priming, troweling, sanding, and topcoating of cove base. Round internal and external corners.

1. Integral Cove Base: 8-inch (203 mm) high.

F. Self-Leveling Body Coats: Apply self-leveling slurry body coats in thickness specified for flooring system.

1. Aggregates: Broadcast aggregates at rate recommended in writing by manufacturer. After resin is cured, remove excess aggregates to provide surface texture indicated.

G. Topcoats: Apply topcoats in number indicated for flooring system specified, at spreading rates recommended in writing by manufacturer, and to produce wearing surface specified.

3.4 FIELD QUALITY CONTROL

A. Material Sampling: Owner may, at any time and any number of times during resinous flooring installation, 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 reinstall flooring materials to comply with requirements.

B. Core Sampling: At Owner's direction and at locations designated by Owner, take one core sample per 1000 sq. ft. (92.9 sq. m) 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.

3.5 PROTECTION

A. 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.

END OF SECTION 096723

SECTION 096813 - TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Modular carpet tile.

B. Related Requirements:
1. Section 096513 "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.
2. Section 096816 "Sheet Carpeting" for carpet roll goods.

1.3 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.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
2. Include manufacturer's written installation recommendations for each type of substrate.

B. Shop Drawings: For carpet tile installation, plans showing the following:

1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
2. Carpet tile type, color, and dye lot.
3. Type of subfloor.
4. Type of installation.

5. Pattern of installation.
6. Pattern type, location, and direction.
7. Pile direction.
8. Type, color, and location of insets and borders.
9. Type, color, and location of edge, transition, and other accessory strips.
10. Transition details to other flooring materials.

C. Samples: 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.
2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- (300-mm-) long Samples.

D. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

E. Sustainable Product Certification: Provide ANSI/NSF 140 certification for carpet products.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.

C. Sample Warranty: For special warranty.

1.6 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.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

1.8 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. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Build mockups at locations and in sizes shown on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Comply with the Carpet and Rug Institute's CRI 104.

1.10 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 levels planned for building occupants 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.

D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.11 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, the following:

    a. More than 10 percent edge raveling, snags, and runs.
    b. Dimensional instability.
    c. Excess static discharge.
    d. Loss of tuft-bind strength.
    e. Loss of face fiber.
    f. Delamination.

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

PART 2 - PRODUCTS

2.1 CARPET TILE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. J&J Flooring Group LLC.
2. Mannington Mills, Inc.
3. Mohawk Carpet, LLC; The Mohawk Group.
4. Patcraft; a division of Shaw Industries, Inc.
5. Shaw Industries Group, Inc.; Berkshire Hathaway Company.
6. Tandus; a Tarkett company.

B. Color: Match Architect's samples.

C. Pattern: Match Architect's samples.

D. Primary Backing/Backcoating: Manufacturer's standard composite materials.

E. Size: Refer to Finish Schedule.

F. Applied Treatments:

1. Soil-Resistance Treatment: Manufacturer's standard treatment.
2. Antimicrobial Treatment: Manufacturer's standard treatment that protects carpet tiles as follows:

a. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria, not less than 1-mm halo of inhibition for gram-negative bacteria, and no fungal growth, according to AATCC 174.

G. Performance Characteristics:

1. Appearance Retention Rating: Heavy traffic, 3.0 minimum according to ASTM D7330.
2. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm according to NFPA 253.
3. Dry Breaking Strength: Not less than 100 lbf (445 N) according to ASTM D2646.
4. Tuft Bind: Not less than 5 lbf (22 N) for cut pile, 10 lbf (45 N) for loop pile according to ASTM D1335.
5. Dimensional Tolerance: Within 1/32 inch (0.8 mm) of specified size dimensions, as determined by physical measurement.
6. Dimensional Stability: 0.2 percent or less according to ISO 2551 (Aachen Test).
7. Noise Reduction Coefficient (NRC): 0.35 according to ASTM C423.
8. Colorfastness to Crocking: Not less than 4, wet and dry, according to AATCC 165.
9. Colorfastness to Light: Not less than 4 after 60 AFU (AATCC fading units) according to AATCC 16, Option E.
10. Electrostatic Propensity: Less than 3.5 kV according to AATCC 134.

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.

C. Metal Edge/Transition Strips: Extruded aluminum with finish as indicated on Finish Schedule finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

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.

B. Examine carpet tile for type, color, pattern, and potential defects.

C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.

1. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. (304.8 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.

D. Wood Subfloors: Verify the following:

1. Underlayment over subfloor complies with requirements specified in Section 061600 "Sheathing."
2. Underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.

E. Metal Subfloors: Verify the following:

1. Underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.

F. 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 (3 mm), protrusions more than 1/32 inch (0.8 mm), and substances that may interfere with adhesive bond or show through surface.

G. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with the Carpet and Rug Institute's CRI 104 and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.

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 (3 mm) wide or wider, and protrusions more than 1/32 inch (0.8 mm) unless more stringent requirements are required by manufacturer's written instructions.

C. Concrete Substrates: 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 adhesive and carpet tile manufacturers.

D. Metal Substrates: Clean grease, oil, soil and rust, and prime if recommended in writing by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.

E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with the Carpet and Rug Institute's CRI 104, Section 10, "Carpet Tile," and with carpet tile manufacturer's written installation instructions.

B. Installation Method: Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive.

C. Maintain dye-lot integrity. Do not mix dye lots in same area.

D. Maintain pile-direction patterns indicated on Drawings.

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 carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.

H. Install pattern parallel to walls and borders.

I. Access Flooring: Stagger joints of carpet tiles so carpet tile grid is offset from access flooring panel grid. Do not fill seams of access flooring panels with carpet adhesive; keep seams free of adhesive.

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 the Carpet and Rug Institute's CRI 104, Section 13.7.

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 099113

EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and paint systems application on the following exterior substrates:

1. Concrete.
2. Fiber cement board.
3. Concrete masonry units (CMUs).
4. Steel/iron, galvanized metal.
5. Aluminum (not anodized or otherwise coated).
6. Copper.
7. Stainless steel.
8. Wood.
9. Fiberglass.
10. Plastic.
11. Portland cement plaster (stucco).
12. Gypsum board.

B. Related Requirements: paint exposed surfaces, except where finish schedule indicates a surface/material is not to be painted/remain natural. If finish schedule does not specifically mention an item/surface, paint item/surface same as similar adjacent materials or surfaces (whether or not schedules indicate colors). If schedules do not indicate color or finish, Architect will select from standard colors and finishes available.

C. Painting includes field painting of exposed bare pipes, covered pipes, and ducts (including color coding), hangers, exposed steel/iron work, and primed metal surfaces of mechanical/electrical equipment.

1. Section 051200 "Structural Steel Framing" shop priming of metal substrates.
2. Section 055000 "Metal Fabrications" shop priming metal fabrications.
3. Section 055213 "Pipe Railings & Handrails" shop priming pipe and tube railings.
4. Section 099600 "Floor Sealer" tile like coatings.

1.2 DEFINITIONS

A. MPI Gloss Level 1: max. 5 units @ 60 degrees & 10 units @ 85 degrees per ASTM D-523.

B. MPI Gloss Level 3: 10 to 25 units @ 60 degrees & 10 to 35 units @ 85 degrees per ASTM D-523.

C. MPI Gloss Level 4: 20 to 35 units @ 60 degrees & min. 35 units @ 85 degrees per ASTM D-523.

D. MPI Gloss Level 5: 35 to 70 units @ 60 degrees per ASTM D-523.

E. MPI Gloss Level 6: 70 to 85 units @ 60 degrees per ASTM D-523.

F. MPI Gloss Level 7: min. 85 units @ 60 degrees per ASTM D-523.

1.3 SUBMITTALS

A. Product Data: for each product type. Include block fillers and primers.

1. Material List: provide inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer catalog number and general classification.

2. Manufacturer Information: provide manufacturer technical information, including label analysis, handling instructions, storing, and applying each proposed coating material used.

3. Certification by manufacturer that supplied products comply with local regulations controlling use of volatile organic compounds (VOCs)

4. Samples for Initial Selection: manufacturer color charts showing full range of available colors for each type of finish coat material. After color selection, Architect will furnish color chips for surfaces to be coated.

B. Samples for Verification: each color and material to be applied, with texture simulating actual conditions, on representative Samples of actual substrate.

1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.

2. For each sample, provide materials list and applications for each coat. Label each sample for location and application.

3. Submit Samples on 8” square rigid backing for Architect review of color & texture only: standard synthetic cementitious finish. Label each coat of each Sample (noting location and application area). Note: color and gloss of Samples change as they age; 7-day old Samples appear different from freshly dried Samples. Apply coats on Samples in steps to show each coat required for system.

C. Qualification Data: firms and persons specified in "Quality Assurance" Article demonstrating capabilities and experience. Include lists of completed projects with project names/addresses, Architects and Owners names/addresses, and other information specified

D. Product List: cross-reference paint system and application areas locations. Use same designations indicated on Drawings and in schedules. Include color designations.

1.4 MAINTENANCE MATERIAL SUBMITTALS: furnish extra materials from the same product run matching installed products which are packaged with protective covering for storage and identified with labels describing contents. Paint: 5%, but not less than 1 gallon of each material and color applied.

1.5 QUALITY ASSURANCE

A. Mockups: apply mockups of each indicated paint system, color, and finish selected to verify preliminary selections made under Sample submittals, 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. Vertical and Horizontal Surfaces: provide samples of 80 SF minimum. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Mockup approval does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.6 DELIVERY, STORAGE, & HANDLING

A. Deliver materials to Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:

1. Product name or title of material and description (generic classification or binder type).

2. Manufacturer's stock number and date of manufacture.

3 Contents by volume, for pigment and vehicle constituents.

4 Thinning instructions.

5 Application instructions.

6. Color name and number.

7. VOC content.

B. Store not in use materials in tightly covered containers, well ventilated areas with ambient temperatures continuously maintained at 45 degrees F minimum.
1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.
3. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.7 FIELD CONDITIONS

A. Apply paints only when surfaces to be painted temperature and ambient air temperatures are between 50 degrees F and 95 degrees F.

B. Do not apply paints in rain, fog, or mist; when relative humidity exceeds 85% at temperatures less than 5 degrees F above dew point or to damp/wet surfaces. Painting may continue during inclement weather if surfaces/areas to be painted are enclosed/heated within temperature limits specified by manufacturer during application and drying periods.

C. Apply solvent thinned paints only when temperature of surfaces to be painted and surrounding air temperatures are between 45 degrees F and 95 degrees F.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: subject to compliance with requirements, provide products by:

1. Benjamin Moore & Co.
2. Glidden Professional.
3. PPG Architectural Finishes, Inc.
4. Sherwin-Williams Company.

B. Products: subject to compliance with requirements, provide one of the products listed in Exterior Painting Schedule for indicated paint category.

2.2 PAINT, GENERAL

A. MPI Standards: products shall comply with standards and listed in "MPI Approved Products Lists."

B. Material Compatibility: material quality

1. Proprietary Names: use of manufacturer proprietary product names to designate colors or materials not intended to imply products named are required to be used to exclusion of equivalent products of other manufacturers. Furnish manufacturer material data and certificates of performance for proposed substitutions.

2. 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.
3. Each coat in paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
4. Colors: see Finish Schedule developed by the Interior Designer.

C. VOC Content: products shall comply with VOC limits of authorities having jurisdiction.

2.3 SOURCE QUALITY CONTROL

A. Paint Materials Testing: Owner reserves right to invoke the following procedure:

1. Owner will engage services of qualified testing agency sampling paint materials. Contractor will be notified in advance and may be present when samples 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

With Applicator present, examine substrates and conditions, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

Work Coordination: review other Sections in which primers are provided to ensure compatibility of total system for various substrates. On request, furnish information on characteristics of finish materials ensuring use of compatible primers. Notify Architect about anticipated problems using materials specified over substrates primed by others.

A. Maximum Moisture Content of Substrates: when measured with electronic moisture meter:

1. Concrete: 12%.
2. Fiber Cement Board: 12%.
3. Masonry (Clay & CMUs): 12%.
4. Wood: 15%.
5. Portland cement Plaster: 12%.
6. Gypsum Board: 12%.

B. Portland cement Plaster Substrates: verify plaster is fully cured.

C. Exterior Gypsum Board Substrates: verify finishing compound sanded smooth.

D. Verify substrates suitability, including surface conditions and compatibility with existing finishes and primers.

E. Proceed with coating application only after unsatisfactory conditions have been corrected. Coating application indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to indicated substrates and paint systems.

B. Remove hardware, covers, plates, and similar items already in place and 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. Upon painting operations completion, use workers skilled in trades involved to reinstall items that were removed. Remove surface applied protection.

C. Clean substrates of substances that could impair paints bonding, including dust, dirt, oil, grease, and incompatible paints. Before applying paint/other surface treatments, clean substances substrates which could impair bond of the various coatings. Remove oil and grease before cleaning as well as incompatible primers and re-prime 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 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 written instructions.

F. Steel Substrates: remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer.

G. Ferrous Metals: clean un-galvanized ferrous metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods complying with Steel Structures Painting Council (SSPC) recommendations. Blast steel surfaces clean. Paint per paint system manufacturer and SSPC-SP 10 requirements, Treat bare, sandblasted, or pickled clean metal with a metal coat wash coat before priming.

H. Shop Primed Steel Substrates: clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with same material as used for shop priming per 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. 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.

L. Plastic Trim Fabrication Substrates: remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

M. Materials Preparation: mix and prepare paint materials per manufacturer written instructions. Maintain containers (used in mixing and applying paint in clean condition), free of foreign materials and residue. Before application stir (as required) material producing mixture of uniform density. Do not stir surface film into the material. If necessary remove surface film and strain material before using. Use only thinners approved by paint manufacturer and only within recommended limits.

N. Tinting: tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match finish coat color, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

A. Apply paints according to manufacturer written instructions and per "MPI Architectural Painting Specification Manual" recommendations.

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/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. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, or other surface imperfections. Cut in sharp lines and color breaks.

D. Block Fillers: apply block fillers to concrete masonry block at rate ensuring complete coverage with pores filled.

E. Painting 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 and switch gear.
b. Uninsulated metal and plastic piping.
c. Pipe hangers and supports.
d. Metal and plastic conduit.

A. Prime Coats: before applying finish coats, apply prime coat as recommended by manufacturer to material required to be painted/finished which has not been prime coated by others. Re-coat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, ensuring finish coat with no burn through or other defects due to insufficient sealing.

B. Pigmented (Opaque) Finishes: completely cover surfaces as necessary to provide smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, or other surface imperfections will not be acceptable.

C. Completed Work: match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage services of 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 dry applied paint film thickness not complying with paint manufacturer 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 & 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 and Masonry (Other than Concrete Masonry Units): provide the following finish systems over exterior concrete, stucco, and masonry surfaces:

1 Low Luster Acrylic Finish: 2 finish coats over a primer.

a. Primer: alkali resistant, exterior, acrylic latex primer applied at manufacturer recommended spreading rate to achieve total dry film thickness of 1.3 mils minimum.

b. 1st and 2nd Coats: low luster (eggshell or satin), exterior, acrylic latex paint applied at manufacturer recommended spreading rate achieving total dry film thickness of 2.3 mils minimum.

B. Smooth Wood: provide the following finish systems over smooth wood siding and other smooth, exterior wood surfaces:

1. Low Luster Acrylic Finish: 2 finish coats over a primer.

a. Primer: exterior, alkyd or latex, wood primer, as recommended by the manufacturer for this substrate, applied at manufacturer recommended spreading rate to achieve total dry film thickness of 1.5 mils minimum.

b. 1st and 2nd Coats: low sheen (eggshell or satin), exterior, latex paint applied at manufacturer recommended spreading rate to achieve total dry film thickness of 2.3 mils minimum.

C. Concrete Substrates - Traffic Surfaces:

1. Latex Floor Paint System MPI EXT 3.2A:

a. Prime Coat: floor paint, latex, matching topcoat.
b. Intermediate Coat: floor paint, latex, matching topcoat.
c. Topcoat: floor paint, latex, low gloss (maximum MPI Gloss Level 3), MPI #60.

2. Latex Deck Coating System MPI EXT 3.2B:

a. Prime Coat: recommended in writing by topcoat manufacturer.
b. Intermediate Coat: recommended in writing by topcoat manufacturer.
c. Topcoat: deck coating, latex, MPI #127.

3. Alkyd Floor Enamel System MPI EXT 3.2D:

a. Prime Coat: floor enamel, matching topcoat.
b. Intermediate Coat: floor enamel, matching topcoat.
c. Topcoat: floor enamel, alkyd, gloss (MPI Gloss Level 6), MPI #27.

d. Additive: manufacturer standard additive increasing painted surface skid resistance

4. Clear Water Based Sealer System MPI EXT 3.2H:

a. Prime Coat: sealer, water based, matching topcoat.
b. Intermediate Coat: sealer, water based, matching topcoat.
c. Topcoat: sealer, water based, for concrete floors, MPI #99.

5. Clear Sealer System MPI EXT 3.2G:

a. Prime Coat: sealer, solvent based, matching topcoat.
b. Intermediate Coat: sealer, solvent based, matching topcoat.

c. Topcoat: sealer, solvent based, for concrete floors, MPI #104.

D. Cement Board Substrates:

1. Latex System MPI EXT 3.3J:
   a. Prime Coat: primer, alkali resistant, water based, MPI #3.
   b. Intermediate Coat: latex, exterior, matching topcoat.
   c. Topcoat: latex, exterior, low sheen (MPI Gloss Level 3-4), MPI #15.
2. Latex Aggregate System MPI EXT 3.3G:
   a. Prime Coat: recommended in writing by topcoat manufacturer.
   b. Intermediate Coat: recommended in writing by topcoat manufacturer.
   c. Topcoat: textured coating, latex, non-flat, MPI #41.

E. CMU Substrates:

1. Latex System MPI EXT 4.2A:
   a. Prime Coat: block filler, latex, interior/exterior, MPI #4.
   b. Intermediate Coat: latex, exterior, matching topcoat.
   c. Topcoat: latex, exterior, flat (MPI Gloss Level 1), MPI #10.
2. Latex over Alkali Resistant Primer System MPI EXT 4.2L:
   a. Prime Coat: primer, alkali resistant, water based, MPI #3.
   b. Intermediate Coat: latex, exterior, matching topcoat.
   c. Topcoat: latex, exterior, flat (MPI Gloss Level 1), MPI #10.
3. Latex Aggregate System MPI EXT 4.2B:
   a. Prime Coat: recommended in writing by topcoat manufacturer.
   b. Intermediate Coat: recommended in writing by topcoat manufacturer.
   c. Topcoat: textured coating, latex, flat, MPI #42.

F. Steel and Iron Substrates:

1. Water Based Light Industrial Coating System MPI EXT 5.1M:
   a. Prime Coat: primer, rust inhibitive, water based MPI #107.
   b. Prime Coat: shop primer specified in Section where substrate is specified.
   c. Intermediate Coat: light industrial coating, exterior, water based, match topcoat.
   d. Topcoat: light industrial coating, exterior, water based, semi-gloss (MPI Gloss Level 5); MPI #163.

2. Alkyd System MPI EXT 5.1D:

    a. Prime Coat: primer, alkyd, anticorrosive, for metal, MPI #79.

    b. Prime Coat: shop primer specified in Section where substrate is specified.

    c. Intermediate Coat: exterior, alkyd enamel, matching topcoat.

    d. Topcoat: alkyd, exterior, semi-gloss (MPI Gloss Level 5), MPI #94.

3. Quick Dry Enamel System MPI EXT 5.1A:

    a. Prime Coat: primer, alkyd, quick dry, for metal, MPI #76.

    b. Intermediate Coat: alkyd, quick dry, matching topcoat.
    c. Topcoat: alkyd, quick dry, semi-gloss (MPI Gloss Level 5), MPI #81.

4. Aluminum Paint System MPI EXT 5.1K:

    a. Prime Coat: primer, alkyd, anti-corrosive, for metal, MPI #79.
    b. Intermediate Coat: aluminum paint, matching topcoat.
    c. Topcoat: aluminum paint**,** MPI #1.

G. Galvanized Metal Substrates:

1. Latex System MPI EXT 5.3H:

    a. Prime Coat: primer, galvanized, water based, MPI #134.

    b. Intermediate Coat: latex, exterior, matching topcoat.

    c. Topcoat: latex, exterior, semi-gloss (MPI Gloss Level 5), MPI #11.

2. Alkyd System MPI EXT 5.3B:

    a. Prime Coat: primer, galvanized, cementitious, MPI #26.

    b. Intermediate Coat: exterior, alkyd enamel, matching topcoat.

    c. Topcoat: alkyd, exterior, semi-gloss (MPI Gloss Level 5), MPI #94.

H. Aluminum Substrates:

1. Latex System MPI EXT 5.4H:

    a. Prime Coat: primer, quick dry, for aluminum, MPI #95.

    b. Intermediate Coat: latex, exterior, matching topcoat.

    c. Topcoat: latex, exterior, low sheen (MPI Gloss Level 3-4), MPI #15.

2. Alkyd System MPI EXT 5.4F:

a. Prime Coat: primer, quick dry, for aluminum, MPI #95.

b. Intermediate Coat: exterior, alkyd enamel, matching topcoat.

c. Topcoat: alkyd, exterior, semi-gloss (MPI Gloss Level 5), MPI #94.

I. Stainless Steel Substrates:

1. Latex System MPI EXT 5.6F:

a. Prime Coat: primer, bonding, solvent based, MPI #69.

b. Intermediate Coat: latex, exterior, matching topcoat.

c. Topcoat: latex, exterior, semi-gloss (MPI Gloss Level 5), MPI #11.

2. Alkyd System MPI EXT 5.6A:

a. Intermediate Coat: exterior, alkyd enamel, matching topcoat.

b. Topcoat: alkyd, exterior, semi-gloss (MPI Gloss Level 5), MPI #94.

J. Wood Substrates: Exposed framing.

1. Latex over Latex Primer System MPI EXT 6.2M:

a. Prime Coat: primer, latex for exterior woo, MPI #6.

b. Intermediate Coat: latex, exterior, matching topcoat.
c. Topcoat: latex, exterior, flat (MPI Gloss Level 1), MPI #10.

d. Topcoat: latex, exterior, low sheen (MPI Gloss Level 3-4), MPI #15.

e. Topcoat: latex, exterior, semi-gloss (MPI Gloss Level 5), MPI #11.

K. Wood Substrates: Wood trim, Architectural woodwork, Doors, Windows, Wood board siding and wood fences.

1. Latex over Latex Primer System MPI EXT 6.3L:

a. Prime Coat: Primer, latex for exterior wood, MPI #6.

b. Intermediate Coat: latex, exterior, matching topcoat.
c. Topcoat: latex, exterior, flat (MPI Gloss Level 1), MPI #10.

d. Topcoat: latex, exterior, low sheen (MPI Gloss Level 3-4), MPI #15.

e. Topcoat: latex, exterior, semi-gloss (MPI Gloss Level 5), MPI #11.

2. Latex System MPI EXT 6.3A:

a. Prime Coat: primer, alkyd for exterior wood, MPI #5.

b. Intermediate Coat: latex, exterior, matching topcoat.
c. Topcoat: latex, exterior, flat (MPI Gloss Level 1), MPI #10.

d. Topcoat: latex, exterior, low sheen (MPI Gloss Level 3-4), MPI #15.

e. Topcoat: latex, exterior, semi-gloss (MPI Gloss Level 5), MPI #11.

L. Plastic Trim Fabrication Substrates:

1. Latex System MPI EXT 6.8A:

a. Prime Coat: primer, bonding, water based, MPI #17.

b. Intermediate Coat: latex, exterior, matching topcoat.

c. Topcoat: latex, exterior, low sheen (MPI Gloss Level 3-4), MPI #15.

d. Topcoat: latex, exterior, semi-gloss (MPI Gloss Level 5), MPI #11.

M. Portland Cement Plaster Substrates:

1. Latex System MPI EXT 9.1A:

a. Prime Coat: latex, exterior, matching topcoat.

b. Intermediate Coat: latex, exterior, matching topcoat.
c. Topcoat: latex, exterior, flat (MPI Gloss Level 1), MPI #10.

N. Exterior Gypsum Board Substrates:

1. Latex System MPI EXT 9.2A:

a. Prime Coat: primer, latex for exterior wood (reduced), MPI #6.

b. Intermediate Coat: latex, exterior, matching topcoat.
c. Topcoat: latex, exterior, flat (MPI Gloss Level 1), MPI #10.

d. Topcoat: latex, exterior, low sheen (MPI Gloss Level 3-4), MPI #15.

e. Topcoat: latex, exterior, semi-gloss (MPI Gloss Level 5), MPI #11.

2. Latex Aggregate System MPI EXT 9.2C:

a. Prime Coat: recommended in writing by topcoat manufacturer.
b. Intermediate Coat: recommended in writing by topcoat manufacturer.

c. Topcoat: textured coating, latex, flat, MPI #42.

O. Exterior Bituminous Coated Substrates:

1. Latex System MPI EXT 10.2A:

a. Prime Coat: primer, rust inhibitive, water based, MPI #107.

b. Intermediate Coat: latex, exterior, matching topcoat.
c. Topcoat: latex, exterior, flat (MPI Gloss Level 1), MPI #10.

2. Aluminum Paint System MPI EXT 10.2D:

a. Prime Coat: primer, rust inhibitive, water based, MPI #107.

b. Intermediate Coat: aluminum paint, matching topcoat.
c. Topcoat: aluminum paint, MPI #1.

END OF SECTION 099113

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Primers.
2. Water-based finish coatings.
3. Floor sealers and paints.
4. Dry fall coatings.

B. Related Requirements:

1. Section 051200 "Structural Steel Framing" for shop priming structural steel.
2. Section 055000 "Metal Fabrications" for shop priming metal fabrications.
3. Section 055113 "Metal Pan Stairs" for shop priming metal pan stairs.
4. Section 099300 "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on interior wood substrates.
5. Section 099600 "High-Performance Coatings" for tile-like coatings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include preparation requirements and application instructions.
2. Indicate VOC content.

B. Samples for Verification: For each type of paint system and each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches (200 mm) 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.

C. Product Schedule: Use same designations indicated on Drawings and in the Interior Painting Schedule to cross-reference paint systems specified in this Section. Include color designations.

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.

1. Paint Products: 5 percent, but not less than 1 gal. (3.8 L) 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. (9 sq. m).
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 (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures of less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Benjamin Moore & Co.
2. Coronado Paint; Benjamin Moore & Co.
3. Sherwin-Williams Company (The). (Basis of Design- Products listed below)

B. Source Limitations: Obtain each paint product from single source from single manufacturer.

2.2 PAINT PRODUCTS, 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. Colors: As indicated in a color schedule on Drawings or as noted in Specifications.

1. Thirty percent of surface area will be painted with deep tones.

2.3 PRIMERS

A. Interior/Exterior Latex Block Filler: Water-based, high-solids, emulsion coating formulated to bridge and fill porous surfaces of exterior concrete masonry units in preparation for specified subsequent coatings.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Benjamin Moore & Co.
b. Sherwin-Williams Company (The). (Loxon)

B. Interior Latex/Acrylic Primer Sealer: Water-based latex/acrylic sealer used on new interior plaster, and gypsum wallboard surfaces.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Benjamin Moore & Co.
b. Sherwin-Williams Company (The). (Tuff Surface)

C. Interior Latex Primer for Wood: Waterborne-emulsion primer formulated for resistance to extractive bleeding, mold, and microbials; for hiding stains; and for use on interior wood subject to extractive bleeding.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Benjamin Moore & Co.
b. Sherwin-Williams Company (The). (Premium Wall & Wood Primer)

D. Water-Based Rust-Inhibitive Primer: Corrosion-resistant, water-based-emulsion primer formulated for resistance to flash rusting when applied to cleaned, interior ferrous metals subject to mildly corrosive environments.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Benjamin Moore & Co.
b. Rust-Oleum Corporation; a subsidiary of RPM International, Inc.
c. Sherwin-Williams Company (The). (Pro-Cryl)

E. Water-Based Galvanized-Metal Primer: Corrosion-resistant, acrylic primer; formulated for use on cleaned/etched, exterior, galvanized metal to prepare it for subsequent water-based coatings.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Benjamin Moore & Co.
b. Rust-Oleum Corporation; a subsidiary of RPM International, Inc.
c. Sherwin-Williams Company (The). (Pro-Cryl)

F. Quick-Drying Aluminum Primer: Corrosion-resistant, solvent-based, alkyd or modified-alkyd primer formulated for quick-drying capabilities and for use on prepared exterior aluminum.

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. Rust-Oleum Corporation; a subsidiary of RPM International, Inc.

G. Water-Based Bonding Primer: Water-based-emulsion primer formulated to promote adhesion of subsequent specified coatings.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Benjamin Moore & Co.
b. Rust-Oleum Corporation; a subsidiary of RPM International, Inc.
c. Sherwin-Williams Company (The).

2.4 WATER-BASED FINISH COATS

A. Interior, Water-Based Light-Industrial Coating, Eggshell: Pigmented, water-based emulsion coating for interior primed wood and metal surfaces (e.g., walls, doors, frames, trim, and sash), providing resistance to moderate abrasion and mild chemical exposure and corrosive conditions.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Benjamin Moore & Co.
b. Sherwin-Williams Company (The).

2. Gloss and Sheen Level: Manufacturer's standard eggshell finish with a gloss of 10 to 25 units at 60 degrees and sheen of 10 to 35 units at 85 degrees when tested in accordance with ASTM D523.

B. Interior, Water-Based Light-Industrial Coating, Semigloss: Pigmented, water-based emulsion coating for interior primed wood and metal surfaces (e.g., walls, doors, frames, trim, and sash), providing resistance to moderate abrasion and mild chemical exposure and corrosive conditions.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Benjamin Moore & Co.
b. Sherwin-Williams Company (The).

2. Gloss Level: Manufacturer's standard semigloss finish with a gloss of 35 to 70 units at 60 degrees when tested in accordance with ASTM D523.

C. Interior, Water-Based Light-Industrial Coating, Gloss: Pigmented, water-based emulsion coating for interior primed wood and metal surfaces (e.g., walls, doors, frames, trim, and sash), providing resistance to moderate abrasion and mild chemical exposure and corrosive conditions.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Benjamin Moore & Co.
b. Sherwin-Williams Company (The).

2. Gloss Level: Manufacturer's standard gloss finish with a gloss of 70 to 85 units at 60 degrees when tested in accordance with ASTM D523.

D. Interior, Latex, High-Performance Architectural Coating, Low Sheen: High-performance architectural latex coating providing a significantly higher level of performance than conventional latex paints in the areas of scrub resistance, burnish resistance, and ease of stain removal.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Benjamin Moore & Co.
b. Sherwin-Williams Company (The).

2. Gloss and Sheen Level: Manufacturer's standard low-sheen finish with a maximum gloss of 10 units at 60 degrees and sheen of 10 to 35 units at 85 degrees when tested in accordance with ASTM D523.

E. Interior, Latex, High-Performance Architectural Coating, Eggshell: High-performance architectural latex coating providing a significantly higher level of performance than conventional latex paints in the areas of scrub resistance, burnish resistance, and ease of stain removal.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Benjamin Moore & Co.
b. Sherwin-Williams Company (The). (ProMar 200)

2. Gloss and Sheen Level: Manufacturer's standard eggshell finish with a gloss of 10 to 25 units at 60 degrees and sheen of 10 to 35 units at 85 degrees when tested in accordance with ASTM D523.

F. Interior, Latex, High-Performance Architectural Coating, Satin: High-performance architectural latex coating providing a significantly higher level of performance than conventional latex paints in the areas of scrub resistance, burnish resistance, and ease of stain removal.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Benjamin Moore & Co.
b. Sherwin-Williams Company (The). (ProMar 200)

2. Gloss and Sheen Level: Manufacturer's standard low-sheen finish with a gloss of 20 to 35 units at 60 degrees and minimum sheen of 35 units at 85 degrees when tested in accordance with ASTM D523.

G. Interior, Latex, High-Performance Architectural Coating, Semigloss: High-performance architectural latex coating providing a significantly higher level of performance than conventional latex paints in the areas of scrub resistance, burnish resistance, and ease of stain removal.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Benjamin Moore & Co.
b. Sherwin-Williams Company (The). (ProMar 200)

2. Gloss Level: Manufacturer's standard semigloss finish with a gloss of 35 to 70 units at 60 degrees when tested in accordance with ASTM D523.

H. Interior, Urethane Enamel, High-Performance Architectural Coating, Satin: High-performance architectural urethane enamel coating providing a significantly higher level of performance than conventional latex paints in the areas of scrub resistance, burnish resistance, and ease of stain removal.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Benjamin Moore & Co.
b. Sherwin-Williams Company (The). (Emerald Urethane Trim Enamel)

2. Gloss and Sheen Level: Manufacturer's standard low-sheen finish with a gloss of 20 to 35 units at 60 degrees and minimum sheen of 35 units at 85 degrees when tested in accordance with ASTM D523.

I. Textured Latex/Acrylic Coating, Flat: Pigmented, water-based coating, for use on interior plaster and drywall.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Benjamin Moore & Co.
b. Sherwin-Williams Company (The). (Tuff Surface)

2. Gloss and Sheen Level: Manufacturer's standard flat finish with a maximum gloss of 5 units at 60 degrees and maximum sheen of 10 units at 85 degrees when tested in accordance with ASTM D523.

J. Textured Latex/Acrylic Coating, Nonflat: Pigmented, water-based coating, containing a coarse or medium-sized sand or other hard aggregate, for use on exterior masonry, concrete, concrete block, plaster and drywall.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Benjamin Moore & Co.
b. Sherwin-Williams Company (The). (Tuff Surface)

2. Gloss and Sheen Level: Manufacturer's standard low-sheen finish with a gloss of 5 to 25 units at 60 degrees and sheen of 10 to 35 units at 85 degrees when tested in accordance with ASTM D523.
3. Aggregate Size: Fine.

2.5 FLOOR SEALERS AND PAINTS

A. Alkyd Floor Enamel, Gloss: Solvent-based, alkyd enamel; self-priming where applied to bare wood; formulated to hide stains, for durability, for microbial and abrasion resistance, and for use on wood-board, traffic surfaces.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Benjamin Moore & Co.
b. Sherwin-Williams Company (The).

2. Gloss Level: Manufacturer's standard gloss finish with a gloss of 70 to 85 units at 60 degrees when tested in accordance with ASTM D523.
3. Slip-Resistant Aggregate: Manufacturer's standard additive.

2.6 DRY FALL COATINGS

A. Dry Fall, Latex, Flat: Pigmented, water-based, emulsion-type, fast-drying coating for use on interior plaster, concrete, gypsum board, primed wood, and metal ceilings.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Benjamin Moore & Co.
b. Sherwin-Williams Company (The).

2. Gloss and Sheen Level: Manufacturer's standard flat finish.

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. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.

F. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

G. 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 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 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 11.

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, 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.

K. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 INSTALLATION

A. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.

2. Paint surfaces behind movable 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.

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 equipment rooms:

    a. Equipment, including panelboards.
    b. Uninsulated metal piping.
    c. Pipe hangers and supports.
    d. Metal conduit.
    e. Tanks that do not have factory-applied final finishes.
    f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.

2. 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.
    i. Access panels.

3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

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.

1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
2. Dispose of contaminants in accordance with requirements of authorities having jurisdiction.
3. Allow empty paint cans to dry before disposal.
4. Collect waste paint by type and deliver to recycling or collection facility.

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. Concrete Substrates, Nontraffic Surfaces:

1. High-Performance Architectural Latex System:

a. Prime Coat: Alkali-resistant, water based primer.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior latex, high-performance architectural coating, eggshell.

B. Concrete Substrates, Traffic Surfaces:

1. Alkyd Floor Enamel System:

a. Prime Coat: Matching topcoat.
b. Intermediate Coat: Matching topcoat.

c. Topcoat: Alkyd floor enamel, gloss.

C. CMU Substrates:

1. High-Performance Architectural Latex System:

a. Block Filler: Interior/exterior latex block filler.
b. Prime Coat: Alkali-resistant, water-based primer.
c. Intermediate Coat: Matching topcoat.
d. Topcoat: Interior, latex, high-performance architectural coating, eggshell.

D. Steel Substrates:

1. High-Performance Architectural Urethane Enamel System:

a. Prime Coat: Latex Primer, rust-inhibitive, water based.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Topcoat: Interior, urethane enamel, high-performance architectural coating, satin.

E. Galvanized-Metal Substrates:

1. High-Performance Architectural Urethane Enamel System:

a. Prime Coat: Water-based galvanized primer.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior, urethane enamel, high-performance architectural coating, satin.

F. Exposed Wood Framing:

1. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Interior latex primer for wood.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior, latex, institutional low odor/VOC, semigloss.

G. Finish Carpentry: Wood trim Doors Windows and Wood board paneling.

1. High-Performance Architectural Urethane Enamel System:

a. Prime Coat: Interior latex primer for wood.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior, urethane enamel, high-performance architectural coating, satin.

H. Architectural Woodwork: Wood paneling and casework.

1. High-Performance Architectural Urethane Enamel System:

a. Prime Coat: Interior latex primer for wood.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior, urethane enamel, high-performance architectural coating, satin.

I. Fiberglass Substrates:

1. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Solvent-based bonding primer.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior, latex, institutional low odor/VOC, satin.

J. Plastic Substrates:

1. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Solvent-based bonding primer.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior, latex, institutional low odor/VOC, satin.

K. Spray-Textured Ceiling Substrates:

1. Latex System: Spray applied:

a. Prime Coat: Matching topcoat.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior, latex, flat.

L. Gypsum Board and Plaster Substrates:

1. High-Performance Architectural Latex System: Typical unless noted otherwise.

a. Prime Coat: Interior latex primer sealer.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior, latex, high-performance architectural coating, flat, low sheen or eggshell as indicated on the finish schedule.

2. Water-Based Light-Industrial Coating System: Service/wet areas

a. Prime Coat: Interior latex primer sealer.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior, water-based, light-industrial coating, eggshell.

M. Cotton or Canvas and ASJ Insulation-Covering Substrates: Including pipe and duct coverings.

1. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Interior latex primer sealer.
b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior, latex, institutional low odor/VOC, flat.

N. Bituminous-Coated Substrates:

1. Latex System:

a. Prime Coat: Water-based rust-inhibitive primer.

b. Intermediate Coat: Matching topcoat.
c. Topcoat: Interior, latex, flat.

END OF SECTION 099123

SECTION 101400

SIGNS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following Interior Signage requirements:

1. Interior door, room, wall mounted evacuation and directional signage shall be included.

2. Provide signage at each resident unit corridor door indicating the room number, with removable insert for the occupant's name. All administrative, public rooms, common rooms, maintenance areas, building service and storage room signs are to identify the space and room number. All public bathrooms and toilets rooms are to have identifying signage.

3. The Contractors' representative and the signage supplier shall meet with the facility owner and the facility management team to coordinate and determine all interior signage requirements

B. <u>All interior signage will be provided under a Contract Allowance of $10,000.00</u>.

1.03 SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data for each type of sign specified, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.

C. Shop drawings showing fabrication and erection of signs. Include plans, elevations, and large-scale sections of typical members and other components. Show anchors, grounds, layout, reinforcement, accessories, and installation details.

D. Samples: Provide the following samples of each sign component for initial selection of color, pattern and surface texture as required and for verification of compliance with requirements indicated.

1. Samples for initial selection of color, pattern, and texture:
   a. Cast Acrylic Sheet and Plastic Laminate: Manufacturer's color charts consisting of actual sections of material including the full range of colors available for each material required.

2. Samples for verification of color, pattern, and texture selected and compliance with requirements indicated:

   a. Cast Acrylic Sheet and Plastic Laminate: Provide a sample panel not less than 8-1/2 inches by 11 inches for each material, color, texture, and pattern required. On each panel include a representative sample of the graphic image process required, showing graphic style, and colors and finishes of letters, numbers, and other graphic devices.

1.04 QUALITY ASSURANCE

A. Sign Fabricator Qualifications: Firm experienced in producing signs similar to those indicated for this Project, with a record of successful in-service performance, and sufficient production capacity to produce sign units required without causing delay in the Work.

B. Single-Source Responsibility: For each separate sign type required, obtain signs from one source of a single manufacturer.

C. Design Concept: Conform to standard HC300 ADA system by “Best Manufacturing” or equal. Sign units by other manufacturers may be considered provided deviations in dimensions and profiles do not change the design concept as judged by the Architect.

D. All interior signage and related mounting shall comply with accessibility requirements of the ADA, UFAS and Florida Building Code.

1.05 PROJECT CONDITIONS

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Manufacturers of Panel Signs:
   a. ABC Architectural Signing System.
   b. Allenite.
   c. Andco Industries Corp.
   d. APCO Graphics, Inc.
   e. ASI Sign Systems, Inc.
   f. Best Manufacturing Company.
   g. Charleston Industries, Inc.
   h. DGS Corp.
   i. Diskey Sign Corp.
   j. Environmental Graphic Systems, Inc.
   k. Modulex.
   l. Mohawk Sign Systems.
   m. Poblocki & Sons, Inc.
   n. Spanjer Brothers, Inc.
   o. The Supersine Company.
   p. Vomar Products, Inc.

2.02 MATERIALS

A. Plastic Laminate: Provide high-pressure plastic laminate engraving stock with face and core plies in contrasting colors, in finishes and color combinations indicated or, if not indicated, as selected from the manufacturer's standards.

B. Fasteners: Use concealed fasteners fabricated from metals that are not corrosive to the sign material and mounting surface.

2.03 PANEL SIGNS

A. Panel Signs: The Interior Designer will select all interior door signage from the Contractors submittal as proposed and based on the stated Contract Allowance.

B. Graphic Content and Style: The Interior Designer will specify all text and text styles.

PART 3 EXECUTION

3.01 INSTALLATION

A. General: Install all signage using mounting methods of the type described and in compliance with the manufacturer's instructions.

1. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.

3.02 CLEANING AND PROTECTION

A. After installation, clean soiled sign surfaces according to the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

END OF SECTION

SECTION 102123 - CUBICLE CURTAINS AND TRACK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Cubicle-curtain tracks and carriers.
2. Cubicle curtains.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for supplementary wood framing and blocking for mounting items requiring anchorage.
2. Section 092216 "Non-Structural Metal Framing" for supplementary metal framing and blocking for mounting items requiring anchorage.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For each type of curtain fabric indicated, include durability, laundry temperature limits, fade resistance, applied curtain treatments, and fire-test-response characteristics.

B. Shop Drawings: For curtains and tracks.

1. Show layout and types of cubicles, sizes of curtains, number of carriers, anchorage details, and conditions requiring accessories. Indicate dimensions taken from field measurements.
2. Include details of blocking for track support.

C. Samples: For each exposed product and for each color and texture specified, 10 inches (254 mm) in size.

D. Samples for Initial Selection: For each type of curtain material indicated.

E. Samples for Verification: For each type of product required, prepared on Samples of size indicated below:

1. Curtain Fabric: Not less than 10 inches (254 mm) square and showing complete pattern repeat, from dye lot used for the Work, with specified treatments applied. Mark top and face of material.
2. Mesh Top: Not less than 10 inches (254 mm) square.
3. Curtain Track: Not less than 10 inches (254 mm) long.
4. Curtain Carrier: Full-size unit.

F. Product Schedule: For curtains and tracks..

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For curtains, tracks, and hardware to include in operation and maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Curtain Carriers and Track End Caps: Full-size units equal to 3 percent of amount installed for each size indicated, but no fewer than 10 units.
2. Curtains: Full-size units equal to 10 percent of amount installed for each size indicated, but no fewer than two units.

1.6 QUALITY ASSURANCE

A. 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 cubicle as shown on Drawings as part of patient-room mockup.
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.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Cubicle Curtains: Provide curtain fabrics with the following characteristics:

1. Laundering: Launderable to a water temperature of not less than 160 deg F (71 deg C).
2. Flame Resistance: Provide fabrics identical to those that have passed NFPA 701 when tested by a qualified testing agency acceptable to authorities having jurisdiction.

    a. Identify fabrics with appropriate markings of a qualified testing agency.

2.2 CUBICLE-CURTAIN SUPPORT SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Construction Specialties, Inc.
2. Covoc Corporation.
3. Cubicle Curtain Factory, Inc.
4. Inpro Corporation.
5. Standard Textile Co., Inc.

B. Extruded-Aluminum Curtain Track: Not less than 1-1/4 inches wide by 3/4 inch high (32 mm wide by 19 mm high).

1. Track Minimum Wall Thickness: 0.058 inch (1.47 mm).
2. Curved Track: Factory-fabricated, 12-inch- (305-mm-) radius bends.
3. Finish: Baked enamel, acrylic, or epoxy.

C. Curtain Track Accessories: Fabricate splices, end caps, connectors, end stops, coupling and joining sleeves, wall flanges, brackets, ceiling clips, and other accessories from same material and with same finish as track.

1. Suspended-Track Support: Not less than 5/8-inch- (16-mm-) square tube.
2. End Stop: Nonremovable.

D. Curtain Roller Carriers: Two nylon rollers and nylon axle with aluminum hook.

E. Exposed Fasteners: Stainless steel.

F. Concealed Fasteners: Stainless steel.

2.3 CURTAINS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Covoc Corporation.
2. Cubicle Curtain Factory, Inc.
3. Inpro Corporation.

B. Fabric: Curtain manufacturer's standard, 100 percent polyester; inherently and permanently flame resistant, stain resistant, and antimicrobial.

1. Proprietary Fiber:

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) INVISTA.
2) Trevira.

2. Pattern: Refer to Drawing ID 0.1 Finish Schedule.
3. Width: As required.
4. Color: As selected by Architect from manufacturer's full range.

C. Curtain Grommets: Two-piece, rolled-edge, rustproof, nickel-plated brass; spaced not more than 6 inches (152 mm) o.c.; machined into top hem.

D. Mesh Top: Not less than 20-inch- (508-mm-) high mesh top.

1. Mesh: No. 50 nylon mesh.

E. Snap Attachments: Provide manufacturer's standard nickel-plated brass snap attachments for modular panels.

F. Curtain Tieback: Nickel-plated brass chain; one at each curtain termination.

2.4 CURTAIN FABRICATION

A. Continuous Curtain Panels:

1. Width: Equal to track length from which curtain is hung plus 10 percent of added fullness, but not less than 12 inches (305 mm) of added fullness.
2. Length: Equal to floor-to-ceiling height, minus depth of track and carrier at top, and minus clearance above the finished floor of 15 inches (381 mm).
3. Mesh Top: Top hem of mesh not less than 1 inch (25.4 mm) and not more than 1-1/2 inches (38 mm) wide, triple thickness, reinforced with integral web, and double lockstitched. Double lockstitch bottom of mesh directly to 1/2-inch (13-mm) triple thickness, top hem of curtain fabric.
4. Bottom Hem: Not less than 1 inch (25.4 mm) and not more than 1-1/2 inches (38 mm) wide, double thickness and double lockstitched.
5. Side Hems: Not less than 1/2 inch (13 mm) and not more than 1-1/4 inches (32 mm) wide, with double turned edges, and single lockstitched.
6. Vertical Seams: Not less than 1/2 inch (13 mm) wide, double turned and double stitched.

B. Modular Shower Curtain Panels:

1. Vinyl Panels: 66 inches (1676 mm) wide. Fabricate panels in quantity required to provide assembled curtains equal to track lengths plus 10 percent added fullness, but not less than 12 inches (305 mm) added fullness.

    a. Top Hem: Not less than 1 inch (25.4 mm) and not more than 1-1/2 inches (38 mm) wide, triple thickness, reinforced with integral web, double lockstitched, and with snap attachments to attach panels to mesh top.
    b. Side Hems: Not less than 1/2 inch (13 mm) and not more than 1-1/4 inches (32 mm) wide, with double turned edges, single lockstitched, and with snap attachments to attach one panel to another.

2. Length: Equal to floor-to-ceiling height, minus depth of track and carrier at top, and minus clearance above the finished floor of 0.5 inches (12.7 mm).

3. Mesh Top: Top hem of mesh not less than 1 inch (25.4 mm) and not more than 1-1/2 inches (38 mm) wide, triple thickness, reinforced with integral web, and double lockstitched.

    a. Type: Modular, matching width of modular fabric panels with snap attachments at side hems of mesh-top panels.

4. Vertical Seams: Not less than 1/2 inch (13 mm) wide, double turned and double stitched.

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. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install tracks level and plumb, according to manufacturer's written instructions.

B. For tracks of up to 20 feet (6.0 m) in length, provide track fabricated from single, continuous length.

1. Curtain-Track Mounting: Surface.

C. Surface-Track Mounting: Fasten tracks to ceilings at intervals recommended by manufacturer. Fasten tracks to structure at each splice and tangent point of each corner. Center fasteners in track to ensure unencumbered carrier operation. Attach track to ceiling as follows:

1. Mechanically fasten directly to bottom of concrete deck with post-installed anchors.
2. Mechanically fasten to furring through suspended ceiling with screw and tube spacer.
3. Mechanically fasten to wood trusses or blocking spanning between wood trusses.

D. Track Accessories: Install splices, end caps, connectors, end stops, coupling and joining sleeves, and other accessories as required for a secure and operational installation.

E. Curtain Carriers: Provide curtain carriers adequate for 6-inch (152-mm) spacing along full length of curtain plus an additional carrier.

F. Cubicle Curtains: Hang curtains on each curtain track. Secure with curtain tieback.

END OF SECTION 102123

SECTION 102600

WALL & DOOR PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS: drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY: section includes corner guards as well as abuse resistant wall coverings.

A. Related Requirements: Section 087111 "Door Hardware" for metal and plastic protective trim units, per BHMA A-156.6, used for armor, kick, mop, and push plates.

1.3 ACTION SUBMITTALS

A. Product Data: each product type. Include construction details, material descriptions, impact strength, dimensions of individual components/profiles, and finishes.

B. Shop Drawings: each type of wall and door protection showing locations and extent. Include plans, elevations, sections, and attachment details.

C. Samples for Initial Selection: each type of impact resistant wall protection unit indicated, in each color and texture specified. Include accent strips and accessory Samples to verify color selection.

D. Samples for Verification: each type of exposed finish on the following products, prepared on Samples of size:

1. Wall Guards: 12” long. Include examples of joinery, corners, end caps, top caps, and field splices.
2. Abuse Resistant Wall Covering: 6” x 6” square.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: each type of exposed plastic material.

B. Sample Warranty: special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: each type of wall and door protection product included in maintenance manuals. Include recommended methods and maintenance frequency for maintaining best condition of plastic covers under anticipated traffic and use conditions as well as precautions

against using cleaning materials and methods that may be detrimental to finishes and performance.

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. Wall Guard Covers: full size plastic covers of max length equal to 2% of each type, color, and installed cover texture, but no fewer than 2%, 96" long units.
2. Corner Guard Covers: full size plastic covers of max length equal to 2% of each type, color, and installed cover texture, but no fewer than 2%, 48" long units.
3. Mounting and Accessory Components: amounts proportional to quantities of extra materials. Package mounting and accessory components with each extra material.

1.7 DELIVERY, STORAGE, & HANDLING

A. Store wall and door protection 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 degrees F during the period plastic materials are stored.
2. Keep plastic materials out of direct sunlight.

3. Store plastic wall protection and door protection components for at least 72 hours, or until plastic material attains minimum room temperature of 70 degrees F. Store corner guard covers in a vertical position. Store wall guard covers in a horizontal position.

1.8 WARRANTY

A. Special Warranty: manufacturer agrees to repair/replace components of wall protection and door protection units that fail in materials or workmanship within specified warranty period.

1. Failures include, but not limited to:

   a. Structural failures including detachment of components from each other or from the substrates, delamination, and permanent deformation beyond normal use.
   b. Deterioration of metals, metal finishes, plastics, and other materials beyond normal use.

2. Warranty Period: 5-years from Substantial Completion date.

PART 2 - PRODUCTS

2.1 MANUFACTURERS: source limitations - obtain wall and door protection products of each type from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Surface Burning Characteristics: per ASTM E-84 or UL 723; testing by qualified testing agency. Identify products with appropriate markings of applicable testing agency. Flame Spread Index: 25 or less. Smoke Developed Index: 450 or less.

B. Regulatory Requirements: per applicable provisions in U.S. Architectural & Transportation Barriers Compliance Board ADA-ABA Accessibility Guidelines for Buildings and Facilities, ICC A-117.1

2.3 CORNER GUARDS

A. Surface mounted, opaque plastic corner guards. Provide at all outside corners on VWC and painted walls in Public Areas and Residential Corridors: fabricated as 1-piece from acrylic modified vinyl sheet with formed edges; with 90 degree or turn to match wall condition.

1. Manufacturers: subject to compliance with requirements, provide products by:

a. Construction Specialties, Inc.
b. InPro Corporation (IPC).
c. Korogard Wall Protection Systems.
d. WallGuard.com.

2. Wing Size: Nominal 1-1/8” x 1-1/8”
3. Mounting: adhesive.
4. Color and Texture: selected by Architect from manufacturer full range.

B. Surface mounted, metal corner guards in Main Commercial Kitchen/Prep Areas, Back of House Service Areas and Commercial Laundry: fabricated as 1-piece from formed or extruded metal with formed edges; with 90 degree or turn to match wall condition.

1. Manufacturers: subject to compliance with requirements, provide products by:

a. Balco, Inc.
b. Construction Specialties, Inc.
c. InPro Corporation (IPC).
d. JL Industries, Inc.
e. WallGuard.com.

2. Material: stainless steel sheet, Type 304.

a. Thickness: 0.0625” min.
b. Finish: directional satin, No. 4.

3. Wing Size: nominal 3½” x 3½”

4. Corner Radius: 1/8”
5. Mounting: flat head, countersunk screws through factory drilled mounting holes.

2.4 ABUSE RESISTANT WALL COVERINGS

A. Abuse resistant sheet wall covering in Kitchen 10 feet beyond cooking sources: fabricated from semi-rigid, plastic sheet wall covering material.

1. Manufacturers: subject to compliance with requirements, provide products by:

   a. Construction Specialties, Inc.
   b. InPro Corporation (IPC).
   c. Korogard Wall Protection Systems.
   d. WallGuard.com.

2. Size: 4’ x 8’ for sheet, 4’ x 10’ for roll.
3. Sheet Thickness: 0.060”
4. Color and Texture: selected by Architect from manufacturer full range.
5. Height: as indicated.
6. Trim and Joint Moldings: extruded rigid plastic matching wall covering color.
7. Mounting: adhesive.

B. Laminated, Impact Resistant Wall Panels: consisting of semi-rigid plastic sheet wall covering material factory laminated to high impact resistant core with moisture resistant vapor barrier factory laminated to reverse side of panel for stability.

1. Manufacturers: Subject to compliance with requirements, provide products by:

   a. Construction Specialties, Inc.
   b. InPro Corporation (IPC).

2. Composition: 0.04” thick plastic sheet laminated to 3/8” thick particleboard or medium density fiberboard core.
3. Sheet Size: 4’ x 10’
4. Height: full wall.
5. Sheet Edge: square.
6. Trim and Joint Moldings: extruded rigid plastic that matches wall covering color.
7. Color and Texture: selected by Architect from manufacturer full range.
8. Mounting: adhesive.

2.5 MATERIALS

A. Plastic Materials: chemical resistant and stain resistant, high impact resistant plastic with integral color throughout; extruded and sheet material as required, thickness as indicated.

B. Polycarbonate Plastic Sheet: ASTM D-6098, S-PC01, Class 1 or Class 2, abrasion resistant; with minimum impact resistance rating of 15 ft.-lbf/in. of notch when tested per ASTM D-256, Test Method A.

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: recommended by protection product manufacturer with VOC content of 70 g/L or less.

2.6 FABRICATION

A. Fabricate wall and door protection according to requirements indicated for design, performance, dimensions, and member sizes, including thicknesses of components.

B. Curved Panels: preform curved semi-rigid, abuse resistant sheet wall covering in factory for radius and sheet thickness as follows:

1. Sheet Thickness of 0.040”: 24” radius.
2. Sheet Thickness of 0.060”: 36” radius.

C. Factory Assembly: assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.

D. Quality: fabricate components with uniformly tight seams/joints and with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

2.7 FINISHES

A. Protect 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.

PART 3 - EXECUTION

3.1 EXAMINATION

A. With Installer present, examine substrates and wall areas, for compliance with requirements for installation tolerances, fire rating, and other conditions affecting performance of the Work.

B. Examine walls to which wall and door protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners. Note: wall and door protection attached with adhesive, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Complete finishing operations, including painting, before installing wall and door protection.

B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

A. Installation Quality: wall and door protection per manufacturer written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

B. Accessories: provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.

1. Provide anchoring devices and suitable locations to withstand imposed loads.
2. Where splices occur in horizontal runs of more than 20’, splice aluminum retainers and plastic covers at different locations along the run, but no closer than 12” apart.
3. Adjust end and top caps as required to ensure tight seams.

C. Abuse Resistant Wall Covering: install top and edge moldings, corners, and divider bars as required for a complete installation.

3.4 CLEANING

A. Immediately after completion of installation, clean plastic covers and accessories using a standard ammonia-based household cleaning agent.

B. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION 102600

SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.
2. Private-use bathroom accessories.
3. Underlavatory guards.
4. Custodial accessories.

B. Related Requirements:

1. Section 088300 "Mirrors" for frameless mirrors.
2. Section 093013 "Ceramic Tiling" for ceramic toilet and bath accessories.

1.2 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.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.3 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 anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.

B. Samples: Full size, for each exposed product and for each finish specified.

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 accessories using designations indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For accessories to include in maintenance manuals.

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 OWNER-FURNISHED MATERIALS

A. Owner-Furnished Materials: Automatic Soap Dispensers, Toilet Tissue Dispensers, Automatic Paper Towel Dispensers.

2.2 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.

2.3 PUBLIC-USE WASHROOM ACCESSORIES

A. Source Limitations: Obtain public-use washroom accessories from single source from single manufacturer unless noted otherwise below.

B. Toilet Tissue (Roll) Dispenser:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. AJW Architectural Products.
b. American Specialties, Inc.
c. Bobrick Washroom Equipment, Inc.
d. Bradley Corporation.
e. GP, Compact

2. Description: Double-roll dispenser.

3. Mounting: Surface mounted.
4. Operation: Noncontrol delivery with theft-resistant spindle.
5. Capacity: Designed for 5-inch- (127-mm-) diameter tissue rolls.
6. Material and Finish: Stainless steel, No. 4 finish (satin).
7. Basis of Design: GP Compact 56798

C. Automatic Paper Towel (Roll) Dispenser:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. AJW Architectural Products.
   b. American Specialties, Inc. (ASI).
   c. Bobrick Washroom Equipment, Inc.
   d. Bradley Corporation.
   e. GP, enMotion.

2. Description: Automatic motion sensing mechanism with user-adjustable delay and paper towel length; battery powered.
3. Mounting: Surface mounted.
4. Minimum Capacity: 8-inch- (203-mm-) wide, 800-foot- (244-m-) long roll.
5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
6. Lockset: Tumbler type.
7. Basis of Design: enMotion 59466A

D. Waste Receptacle:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. AJW Architectural Products.
   b. American Specialties, Inc.
   c. Bobrick Washroom Equipment, Inc.
   d. Bradley Corporation.

2. Mounting: Freestanding.

3. Minimum Capacity: 21 gal (79.5 L).
4. Material and Finish: Stainless steel, No. 4 finish (satin).
5. Liner: Reusable vinyl liner.
6. Basis of Design: Bobrick B-2280.

E. Automatic Soap Dispenser:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. AJW Architectural Products.
   b. American Specialties, Inc. (ASI).
   c. Bradley Corporation.
   d. GP, enMotion.

2. Description: Automatic dispenser with infrared sensor to detect presence of hands; battery powered; designed for dispensing soap in lather form.
3. Mounting: Surface mounted.
4. Capacity: 1000 mL.
5. Materials: Stainless Steel, plastic.
6. Refill Indicator: LED indicator.
7. Low-Battery Indicator: LED indicator.
8. Basis of Design: enMotion 52060

F. Grab Bar:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. AJW Architectural Products.
    b. American Specialties, Inc.
    c. Bobrick Washroom Equipment, Inc.
    d. Bradley Corporation.

2. Mounting: Flanges with concealed fasteners.

3. Material: Stainless steel, 0.05 inch (1.3 mm) thick.

    a. Finish: Smooth, No. 4 finish (satin).

4. Outside Diameter: 1-1/2 inches (38 mm).
5. Configuration and Length: As indicated on Drawings.
6. Basis of Design: Bobrick B-6806

G. Mirror Unit:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

    a. AJW Architectural Products.
    b. American Specialties, Inc.
    c. Bobrick Washroom Equipment, Inc.
    d. Bradley Corporation.

2. Size: As indicated on Interior Design Drawings or to match width of vanity unless noted otherwise.

H. Coat Hook:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. AJW Architectural Products.
    b. American Specialties, Inc.
    c. Bobrick Washroom Equipment, Inc.
    d. Bradley Corporation.

2. Description: Single-prong unit.
3. Material and Finish: Stainless steel, No. 4 finish (satin).
4. Basis of Design: Bobrick B-6827

2.4 PRIVATE-USE BATHROOM ACCESSORIES

A. Source Limitations: Obtain private-use bathroom accessories from single source from single manufacturer unless noted otherwise below.

B. Toilet Tissue Dispenser:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. American Specialties, Inc.
   b. Bobrick Washroom Equipment, Inc.
   c. Bradley Corporation.
   d. GP, Compact

2. Description: Double-roll dispenser.

3. Mounting: Surface mounted.
4. Capacity: Designed for 4-1/2- or 5-inch- (114- or 127-mm-) diameter tissue rolls.
5. Material and Finish: Stainless steel, No. 4 finish (satin).
6. Basis of Design: Bobrick B-6677

C. Paper Towel (Folded) Dispenser:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. AJW Architectural Products.
   b. American Specialties, Inc.
   c. Bobrick Washroom Equipment, Inc.
   d. Bradley Corporation.
   e. GP.

2. Mounting: Surface mounted.
3. Minimum Capacity: 400 C-fold or 525 multifold towels.
4. Material and Finish: Stainless steel, No. 4 finish (satin).
5. Lockset: Tumbler type.
6. Refill Indicator: Pierced slots at sides or front.
7. Basis of Design: Bobrick B-4262

D. Liquid-Soap Dispenser:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. AJW Architectural Products.

b. American Specialties, Inc.
c. Bobrick Washroom Equipment, Inc.
d. Bradley Corporation.
e. GP.

2. Description: Designed for dispensing antibacterial soap in lather form.
3. Mounting: Vertically oriented, surface mounted.
4. Capacity: 50 fl. oz. (1.5 L).
5. Materials: Stainless steel, No. 4 finish (satin).
6. Lockset: Tumbler type.
7. Refill Indicator: Window type.

E. Shower Curtain Rod:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Specialties, Inc.
b. Bobrick Washroom Equipment, Inc.

2. Outside Diameter: 1 inch (25.4 mm).

3. Mounting: Flanges with concealed fasteners.
4. Rod Material and Finish: Stainless steel, No. 4 finish (satin).
5. Flange Material and Finish: Stainless steel, No. 4 finish (satin).
6. Basis of Design: Bobrick B-207

F. Medicine Cabinet:

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. Millwood Pines.

2. Mounting: Recessed, for nominal 4-inch (100-mm) wall depth.

3. Size: 15 7/8 by 25 7/8 inches (405 by 655 mm).
4. Door: Solid Wood Louvered door concealing storage cabinet equipped with continuous hinge and spring-buffered, rod-type stop and magnetic door catch.
5. Shelves: Two, adjustable.
6. Material and Finish:

a. Cabinet: Plastic.
b. Door: Solid wood louvered with shop applied white gloss enamel finish.
c. Hinge: Enameled steel piano-hinge.
d. Shelves: White plastic.

7. Basis of Design: Millwood Pines – Loudon
8. Special Note: Provide 2 cabinets in each Semi-private Unit bathroom.

G. Robe Hook:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

    a. Moen.

2. Description: Double-prong unit.
3. Finish: Brushed Nickel.
4. Basis of Design: Moen YB2203BN
5. Special Note: Provide 2 robe hooks in each Semi-private Unit bathroom.

H. Towel Bar:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

    a. Moen.

2. Description: 3/4-inch- (19-mm-) square tube with rectangular end brackets.

3. Mounting: Flanges with concealed fasteners.
4. Length: 24 inches (610 mm) at shower. Refer to Drawings for mounting locations.
5. Finish: Brushed Nickel.
6. Basis of Design: Moen YB2224BN
7. Special Note: Provide 2 towel bars in each Semi-private Unit bathroom.

I. Grab Bar:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. AJW Architectural Products.
    b. American Specialties, Inc.
    c. Bobrick Washroom Equipment, Inc.
    d. Bradley Corporation.

2. Mounting: Flanges with concealed fasteners.

3. Material: Stainless steel, 0.05 inch (1.3 mm) thick.

    a. Finish: Smooth, No. 4 finish (satin).

4. Outside Diameter: 1-1/2 inches (38 mm).
5. Configuration and Length: As indicated on Drawings.
6. Basis of Design: Bobrick B-6806

2.5 UNDERLAVATORY GUARDS

A. Underlavatory Guard:

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. 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. Source Limitations: Obtain custodial accessories from single source from single manufacturer.

B. Utility Shelf:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. AJW Architectural Products.
    b. American Specialties, Inc.
    c. Bobrick Washroom Equipment, Inc.
    d. Bradley Corporation.

2. Description: With exposed edges turned down not less than 1/2 inch (13 mm) and supported by two triangular brackets welded to shelf underside.

3. Size: 24 inches (610 mm) long by 5 inches (125 mm) deep.
4. Material and Finish: Not less than nominal 0.05-inch- (1.3-mm-) thick stainless steel, No. 4 finish (satin).
5. Basis of Design: Bobrick B-295 x 24

C. Mop and Broom Holder:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. AJW Architectural Products.
    b. American Specialties, Inc.
    c. Bobrick Washroom Equipment, Inc.
    d. Bradley Corporation.

2. Description: 3 mop/broom holder.

3. Length: 36 inches (914 mm).
4. Mop/Broom Holders: Three, spring-loaded, rubber hat, cam type.
5. Material and Finish: Stainless steel, No. 4 finish (satin).
6. Basis of Design: Bobrick B-223

D. Paper Towel (Folded) Dispenser:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. AJW Architectural Products.
   b. American Specialties, Inc.
   c. Bobrick Washroom Equipment, Inc.
   d. Bradley Corporation.

2. Mounting: Surface mounted.
3. Minimum Capacity: 400 C-fold or 525 multifold towels.
4. Material and Finish: Stainless steel, No. 4 finish (satin).
5. Lockset: Tumbler type.
6. Refill Indicator: Pierced slots at sides or front.
7. Basis of Design: Bobrick B-4262

E. Liquid-Soap Dispenser:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. AJW Architectural Products.
   b. American Specialties, Inc.
   c. Bobrick Washroom Equipment, Inc.
   d. Bradley Corporation.

2. Description: Designed for dispensing soap in lather form.

3. Mounting: Vertically oriented, surface mounted.
4. Capacity: 50 fl oz (1.5 L).
5. Materials: ABS plastic.
6. Refill Indicator: Window type.

2.7 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch (0.8-mm) 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 (0.9-mm) minimum nominal thickness.

D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 (Z180) 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.

2.8 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 (1112 N), 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 instructions.

END OF SECTION 102800

SECTION 104413 - FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fire-protection cabinets for the following:

a. Portable fire extinguishers.
b. Fire hose valves.
c. Fire hoses and racks.

B. Related Requirements:

1. Section 104416 "Fire Extinguishers."
2. Section 211200 "Fire-Suppression Standpipes" for fire-hose connections.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.

1. Show location of knockouts for hose valves.

B. Shop Drawings: For fire-protection cabinets. Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each type of exposed finish required.

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

E. Samples for Verification: For each type of exposed finish required, prepared on Samples 6 by 6 inches (150 by 150 mm) square.

F. Product Schedule: For fire-protection cabinets. Indicate whether recessed, semirecessed, or surface mounted. Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule to ensure proper fit and function. Use same designations indicated on Drawings.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.4 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers fire hoses, hose valves, and hose racks indicated are accommodated.

B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

1.5 SEQUENCING

A. Apply vinyl lettering on field-painted fire-protection cabinets after painting is complete.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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.

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.

2.2 FIRE-PROTECTION CABINET Typical through most of the building

A. Cabinet Type: Suitable for fire extinguisher and hose valve.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. JL Industries, Inc.; a division of the Activar Construction Products Group.
b. Larsens Manufacturing Company.

B. Cabinet Construction: Nonrated, 1-hour fire rated and 2-hour fire rated based on Architectural Lifesafety Drawings.

1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.043-inch- (1.09-mm-) thick cold-rolled steel sheet lined with minimum 5/8-inch- (16-mm-) thick fire-barrier material. Provide factory-drilled mounting holes.

C. Cabinet Material: Cold-rolled steel sheet.

1. Shelf: Same metal and finish as cabinet.

D. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).

1. Square-Edge Trim: 1-1/4- to 1-1/2-inch (32- to 38-mm) backbend depth.
2. Rolled-Edge Trim: 2-1/2-inch (64-mm) backbend depth.

E. Cabinet Trim Material: Steel sheet.

F. Door Material: Steel sheet.

G. Door Style: Vertical duo panel with frame.

H. Door Glazing: Acrylic sheet.

1. Acrylic Sheet Color: Clear transparent acrylic sheet.

I. 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.

J. 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. Lettered Door Handle: One-piece, cast-iron door handle with the word "FIRE" embossed into face.
3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated on drawings and where required by code.

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: Red.
4) Orientation: Vertical.

K. Materials:

1. Cold-Rolled Steel: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

a. Finish: Baked enamel or powder coat.
b. Color: White.

2. Transparent Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), 3 mm thick, with Finish 1 (smooth or polished).

2.3 SECURITY FIRE-PROTECTION CABINET At all Memory Care locations.

A. Cabinet Type: Suitable for fire extinguisher and hose valve.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. JL Industries, Inc.; a division of the Activar Construction Products Group.
b. Larsens Manufacturing Company.

B. Cabinet Construction: Nonrated, 1-hour fire rated and 2-hour fire rated based on Architectural Lifesafety Drawings.

1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls lined with minimum 5/8-inch- (16-mm-) thick fire-barrier material.

C. Cabinet Material: 0.068-inch- (1.72-mm-) thick steel sheet.

1. Shelf: Same metal and finish as cabinet.

D. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).

1. Square-Edge Trim: 1-1/4- to 1-1/2-inch (32- to 38-mm) backbend depth.
2. Rolled-Edge Trim: 2-1/2-inch (64-mm) backbend depth.

E. Cabinet Trim Material: Steel sheet.

F. Door Material: 0.097-inch- (2.45-mm-) thick steel sheet.

G. Door Style: Solid opaque panel with frame.

H. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated, and as follows:

1. Recessed door pull.
2. Continuous Hinge: Same material and finish as trim, permitting door to open 180 degrees.
3. Mechanical Deadlock: Lockbolt retracted and extended by five-tumbler paracentric cylinder; keyed one side.

a. Lockbolt: 1-1/2 inches high by 3/4 inch (38 mm high by 19 mm) thick; 5/8-inch (16-mm) throw.

I. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to security 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 security fire-protection cabinet with the words "FIRE EXTINGUISHER."

1) Location: Applied to cabinet door.
2) Application Process: Pressure-sensitive vinyl letters.
3) Lettering Color: Red.
4) Orientation: Vertical.

3. Keys: Three per door lock.

J. Materials:

1. Cold-Rolled Steel: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

a. Finish: Baked enamel or powder coat.
b. Color: White.

2.4 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.
3. Prepare doors and frames to receive locks.
4. Install door locks at factory.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.

1. Fabricate standard fire-protection door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch (13 mm) thick.
2. Fabricate security fire-protection door frames of one-piece construction with edges flanged.
3. Miter and weld perimeter door frames.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.5 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's AMP 500, "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.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for hose valves and cabinets to verify actual locations of piping connections before cabinet installation.

B. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for semirecessed 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 indicated below:

1. Fire-Protection Cabinets: 54 inches (1372 mm) above finished floor to top of cabinet.

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 Hose-Valve Cabinets:

a. Install cabinet with not more than 1/16-inch (1.6-mm) tolerance between pipe OD and knockout OD. Center pipe within knockout.
b. Seal through penetrations with firestopping sealant as specified in Section 078413 "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.

C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. 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.

E. 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.

B. Related Requirements:

1. Section 104413 "Fire Protection Cabinets."
2. Section 233813 "Commercial-Kitchen Hoods" for fire-extinguishing systems provided as part of commercial-kitchen exhaust hoods.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.

B. Product Schedule: For fire extinguishers. Coordinate final fire-extinguisher schedule with fire-protection cabinet schedule to ensure proper fit and function. Use same designations indicated on Drawings.

1.3 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

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. Failures include, but are not limited to, the following:

    a. Failure of hydrostatic test according to NFPA 10.
    b. Faulty operation of valves or release levers.

2. 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.

1. Provide fire extinguishers approved, listed, and labeled by FM Global.

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. Ansul Incorporated; Tyco International.
    c. Buckeye Fire Equipment Company.
    d. JL Industries, Inc.; a division of the Activar Construction Products Group.
    e. Larsens Manufacturing Company.

2. Valves: Manufacturer's standard.
3. Handles and Levers: Manufacturer's standard.
4. 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. Wet-Chemical Type at kitchen locations: UL-rated 2-A:1-B:C:K, 1.6-gal. (6-L) nominal capacity, with potassium acetate-based chemical in stainless-steel container; with pressure-indicating gage.

C. Multipurpose Dry-Chemical Type at all locations excluding kitchens: UL-rated 3-A:40-B:C, 5 lb (2.3 kg) nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.

D. Clean-Agent Type in Aluminum Container in server/communications room: UL-rated 2-B:C, 2.5-lb (1.1-kg) nominal capacity, with HCFC Blend B agent and inert material in enameled-aluminum container; with pressure-indicating gage.

E. Clean-Agent Type in Steel Container in server/communications room: UL-rated 5-B:C, 4.75-lb (2.2-kg) nominal capacity, with HFC blend agent and inert material in enameled-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, with plated or black baked-enamel finish.

B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

a. Orientation: Vertical.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

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

3.2 INSTALLATION

A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.

1. Mounting Brackets: 54 inches (1372 mm) above finished floor to top of fire extinguisher.

B. 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 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Welded corridor lockers.

1.3 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 each type of metal locker.

B. Shop Drawings: For metal lockers.

   1. Include plans, elevations, sections, and attachment details.
   2. Show locker trim and accessories.
   3. Include locker identification system and numbering sequence.

C. Samples: For each color specified, in manufacturer's standard size.

D. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available.

E. Samples for Verification: For the following products, in manufacturer's standard size:

   1. Lockers and equipment.

F. Product Schedule: For lockers.

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. The following metal locker hardware items equal to 10 percent of amount installed for each type and finish installed, but no fewer than five units:

a. Locks.
b. Blank identification plates.
c. Hooks.

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.

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 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 Welded Metal Lockers: Lifetime from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain metal lockers and accessories from single source from single locker manufacturer.

1. Obtain locks from single lock manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: For lockers indicated to be accessible, comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1.

2.3 WELDED CORRIDOR LOCKERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AJW Architectural Products.
2. Lyon LLC.
3. Olympus Lockers & Storage Products, Inc.
4. Penco Products, Inc.
5. Republic Storage Systems, LLC.

B. Doors: One piece; fabricated from 0.075-inch (1.90-mm) nominal-thickness steel sheet; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges.

1. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches (381 mm) wide; welded to inner face of doors.
2. Door Style: Vented panel as follows:

a. Louvered Vents: No fewer than three louver openings at top and bottom for double-tier lockers.

C. Body: Assembled by welding body components together. Fabricate from unperforated steel sheet with thicknesses as follows:

1. Tops, Bottoms, and Sides: 0.060-inch (1.52-mm) nominal thickness.
2. Backs: 0.048-inch (1.21-mm) nominal thickness.
3. Shelves: 0.060-inch (1.52-mm) nominal thickness, with double bend at front and single bend at sides and back.

D. Frames: Channel formed; fabricated from 0.060-inch (1.52-mm) 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.

1. Cross Frames between Tiers: Channel formed and fabricated from same material as main frames; welded to vertical main frames.

E. 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.
1. Hinges: Manufacturer's standard, steel, continuous or knuckle type.

F. Projecting Door Handle and Latch: Finger-lift latch control designed for use with either built-in combination locks or padlocks; positive automatic latching, chromium plated; pry and vandal resistant.

1. Latch Hooks: Equip doors 48 inches (1219 mm) and higher with three latch hooks and doors less than 48 inches (1219 mm) high with two latch hooks; fabricated from 0.105-inch (2.66-mm) nominal-thickness steel sheet; welded or riveted to full-height door strikes; with resilient silencer on each latch hook.
2. 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.

G. Locks: Combination padlocks.

H. Identification Plates: Manufacturer's standard, etched, embossed, or stamped aluminum plates, with numbers and letters at least 3/8 inch (9 mm) high.

I. Hooks: Manufacturer's standard ball-pointed, aluminum or steel; zinc plated.

J. Coat Rods: 1-inch- (25-mm-) diameter steel, chrome finished.

K. Continuous Zee Base: Fabricated from, manufacturer's standard thickness, but not less than 0.060-inch (1.52-mm) nominal-thickness steel sheet.

1. Height: 6 inches (152 mm).

L. Continuous Sloping Tops: Fabricated from 0.048-inch (1.21-mm) nominal-thickness steel sheet, with a pitch of approximately 20 degrees.

1. Closures: Vertical-end type.

M. Recess Trim: Fabricated from 0.048-inch (1.21-mm) nominal-thickness steel sheet.

N. Filler Panels: Fabricated from 0.048-inch (1.21-mm) nominal-thickness steel sheet.

O. Boxed End Panels: Fabricated from 0.048-inch (1.21-mm) nominal-thickness steel sheet.

P. Finished End Panels: Fabricated from 0.024-inch (0.61-mm) nominal-thickness steel sheet to cover unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.

Q. Materials:

1. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B, suitable for exposed applications.

R. Finish: Baked enamel or powder coat.

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

2.4 LOCKS

A. Combination Padlock: Key-controlled, three-number dialing combination locks; capable of five combination changes.

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.

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.
2. Coat Rods: For each compartment of each locker.

D. Welded Construction: Factory preassemble metal lockers by welding all joints, seams, and connections; with no bolts, nuts, screws, or rivets used in assembly of main locker groups. Factory weld main locker groups into one-piece structures. Grind exposed welds smooth and flush.

E. Accessible Lockers: Fabricate as follows:

1. Locate bottom shelf no lower than 15 inches (381 mm) above the floor.
2. Where hooks, coat rods, or additional shelves are provided, locate no higher than 48 inches (1219 mm) above the floor.

F. Continuous Zee Base: Fabricated in lengths as long as practical to enclose base and base ends; finished to match lockers.

G. 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.

H. Individual Sloping Tops: Fabricated in width to fit one locker frame in lieu of flat locker tops; with integral back; finished to match lockers. Provide wedge-shaped divider panels between lockers.

I. Recess Trim: Fabricated with minimum 2-1/2-inch (64-mm) face width and in lengths as long as practical; finished to match lockers.

J. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip-joint filler angle formed to receive filler panel.

K. Boxed End Panels: Fabricated with 1-inch- (25-mm-) wide edge dimension, and designed for concealing fasteners and holes at exposed ends of nonrecessed metal lockers; finished to match lockers.

1. Provide one-piece panels for double-row (back-to-back) locker ends.

L. Finished End Panels: Fabricated to conceal unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.

1. Provide one-piece panels for double-row (back-to-back) locker ends.

M. Center Dividers: Full-depth, vertical partitions between bottom and shelf; finished to match 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. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls, and elsewhere as indicated, for corrosion resistance.
2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and floors or 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. 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 (910 mm) 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. Welded Lockers: Connect groups together with manufacturer's standard fasteners, with no exposed fasteners on face 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 each locker door, near top, centered, with at least two aluminum rivets.
b. Attach plates to upper shelf of each open-front metal locker, centered, with a 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 recess trim to recessed metal lockers with concealed clips.
2. Attach filler panels with concealed fasteners. Locate filler panels where indicated on Drawings.
3. Attach sloping-top units to metal lockers, with closures at exposed ends.
4. Attach boxed end panels using concealed fasteners to conceal exposed ends of nonrecessed metal lockers.
5. Attach finished end panels using fasteners only at perimeter to conceal exposed ends of nonrecessed 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

SECTION 113100
APPLIANCES

PART 1 GENERAL

1.01 RELATED DOCUMENTS: drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following appliance types to be furnished & installed as indicated:
   1. Full Refrigerators
   2. Compact Refrigerators
   2. Washers and Dryers
   4. Combo Washer/Dryer.
   5. Commercial Tumble Dryer
   6. Commercial Washer-Extractor
   7. Combination Double Wall Oven

A. Related Sections: the following contain requirements relating to this Section:
   1. Plumbing connections for appliances as specified in Division 22.
   2. Electrical services/connections for appliances as specified in Division 26. Note: Slide-In Electric Convection Range to have an emergency shut-off switch.

1.03 SUBMITTALS

A. General: submit the following per the Contract Conditions as well as Division 1 Specification Sections.
B. Product data for each appliance type required indicating compliance with requirements, including installation instructions. Provide complete operating and maintenance instructions for each appliance.
B. Schedule: submit schedule of appliances, using the same room designations as shown on drawings.

1.04 QUALITY ASSURANCE

A. Energy Ratings: provide residential appliances carrying labels noting energy cost analysis (estimated annual operating costs) and efficiency information as required by Federal Trade Commission.
B. UL and NEMA Compliance: provide electrical components required as part of appliances listed and labeled by UL and comply with applicable NEMA standards.
C. AHAM Standards: provide appliances conforming to Association of Home Appliance Manufacturers standards: refrigerators and freezers indicating total volume and shelf area ratings certified per ANSI/AHAM HRF-1.
C. Single-Source Responsibility: obtain appliances from a single supplier, also provide products from same manufacturer for each type of required appliance.
D. Design Criteria: residential appliance requirements are based on the specific types and models specified herein. Appliances by other manufacturers may be considered, provided deviations in function, dimension and profile are minor and do not change the design concept as judged by the Owner. Prior to the Bid, alternate proposed appliances shall be submitted to the Owner and Architect. Alternate proposals shall include complete catalog cuts and specifications of both the specified appliance and alternate proposed appliance (noting dimensions, options, and functions). Alternate

proposals will not be considered by the Owner without submission of this information.

1.05 DELIVERY & STORAGE

A. Deliver appliances to the Project site in the manufacturer's undamaged protective packaging.
B. Delay delivery of appliances until utility rough-in is complete and construction in the spaces to receive appliances is substantially complete and ready for installation.

1.06 WARRANTIES

A. Warranty: submit written warranties executed by the manufacturer of each appliance specified agreeing to repair or replace units or components that fail in materials or workmanship within the specified warranty period.
   1. Refrigerator/Freezer: 5-year warranty on the sealed refrigeration system.
   2. Clothes Washer: 2-year warranty on the clothes washer and 5-year warranty on the inner wash basket and washer transmission.
   3. Clothes Dryer: 2-year warranty on the clothes dryer
   4. Clothes Washer/Dryer: 2-year warranty on the clothes washer/dryer and a 5-year warranty on the inner wash basket and washer transmission.
   5. Commercial Tumble Dryer: 2-year warranty on the clothes dryer.
   6. Commercial Washer-Extractor: 5-year warranty on the inner wash basket and washer transmission
   7. Combination Double Wall Oven: 2-year warranty
B. Warranties specified above shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: subject to compliance with requirements, manufacturers offering appliances that may be acceptable to the Owner include, but not limited to:
   1. American Dryer Corp.
   2. General Electric.
   3. Hotpoint.
   4. LG
   5. Maytag Company.
   6. UniMac
   7. Whirlpool Corporation.

2.02 FINISHES: colors – all appliance finishes shall be as scheduled.

PART 3 EXECUTION

3.01 INSTALLATION: general - comply with manufacturer’s instructions and recommendations.

A. Built-in Equipment: securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify clearances are adequate for proper functioning and rough openings are completely concealed.

B. Freestanding Equipment: place units in final locations after finishes have been completed in each area. Verify clearances are adequate to properly operate equipment.
C. Utilities: refer to Divisions 22 and 26 for plumbing and electrical requirements.

3.02 ADJUST & CLEAN

A. Test each residential equipment item verifying proper operation. Make necessary adjustments.
B. Accessories: verify required accessory items have been furnished and installed.
C. Cleaning: remove packing material from residential equipment items. Leave units in clean condition, ready for operation.

3.03 APPLIANCE SCHEDULE

A. General: unless otherwise indicated on the drawings, provide the appliances herein:

1. (Resident Units) GE Compact Undercounter Refrigerator, Model # GCE06GSHSB
2. (Resident Units) GE 0.9 cu. ft. Countertop microwave oven, Model #JES1095SMSS
3. (ADL Suite, Staff #131) GE 21.9 cu. ft., Side-by-side Refrigerator, Model #GZS22DSJSS
4. (Med Prep Rooms) GE Compact Undercounter Refrigerator, Model # GCE06GSHSB
5. (ADL Suite) GE 30” Free-standing, Electric Radiant, Smooth Cooktop Range, Model # JB480SMSS
6. (ADL Suite) GE Dishwasher with front controls, Model #GDF450PSRSS
7. (ADL Suite) GE 1.6 cu. ft. Over-the-Range Microwave Oven, Model #JVM3162RJSS
8. (Resident Laundry) GE 4.8 cu. ft. Front Load Washer, Model #GFW650SPNSN
9. (Resident Laundry) GE 7.8 cu. ft. Front Load Electric Dryer, Model #GFD65ESPNSN
10. (Commercial Clean Laundry) Uni-Mac, 120# Capacity Industrial Tumble Dryer-UT Series. Model No. UT0120DN
11. (Commercial Soiled Laundry) Uni-Mac, 85# Capacity High Performance Industrial Washer Extractor. Model NO. UWT085D4

END OF SECTION 113100

Section 114000

PART 1 FOOD SERVICE EQUIPMENT GENERAL SPECIFICATIONS

1.01 SUMMARY

This Section describes furnishing, installing, adjusting, testing the food preparation, cooking, serving, washing, and storage equipment.

1.02 SCOPE OF WORK

The work of this Section shall consist of the following principal items.

(A) Furnish, deliver, uncrate, assemble, erect, set-in-place, relocate, level and test the equipment specified in this Section as indicated on the food service equipment drawings.

(B) Furnish stands and supports for food service equipment requiring such supports.

(C) Furnish labor, materials and equipment to perform the work required by the drawings and specifications.

(D) Coordinate mechanical and electrical rough-ins, depressed areas, raised bases wall openings, and other special conditions required to accommodate equipment in this contract, including any Owner furnished equipment.

(E) Furnish to the General Contractor any food service equipment parts to be built into the general construction work in ample time for their inclusion in the construction work. Furnish necessary setting plans and instructions for the installation of these parts.

(F) Cut holes in the equipment for pipes, drains, electrical outlets, etc., required for the work of this Section. This work shall include welding of sleeves, collars, ferrules, and escutcheons.

(G) Repair damage to the premises resulting from work of this Section at no additional cost to the Owner.

(H) Furnish switches, starters, controls, and contractors on the various items of food service equipment.

(I) Remove cartons, crates, skids, packing materials and other debris resulting from this installation.

(J) Furnish faucets, wastes, or lever wastes, where specified for sink units.

(K) Furnish data necessary for proper location and sizing of the mechanical connections for the food service equipment.

(L) Notify General Contractor of any special backing or reinforcement needed. Locate such backing or reinforcement. Said backing or reinforcement shall be supplied and installed by the General Contractor.

1.03 RELATED WORK SPECIFIED ELSEWHERE

(A) All electrical, plumbing and mechanical rough-ins, including final connections and hook up services.

(B) Wiring, line switches, safety cut-outs, control panels, contactors, fuse boxes or other related electrical controls or fittings except as specified to the contrary under individual items listed below.

(C) Grease interceptors, shut-off valves, trim traps and related fittings, except as specified to the contrary under individual items listed below.

(D) Construction of concrete bases and floor depressions are a part of the work of the other Sections of the Project Contract documents.

(E) Platforms for equipment or other on roof support systems for the equipment located thereon.

(F) Backing or wall reinforcement for wall mounted equipment.

(G) Furnishing and installing the gas, water, sewer, direct waste, and drainage piping. The traps and valves for that piping are a Part of the work of Division 15, unless specifically called out to be a part of the work of this Section.

(H) Vacuum breakers located above ceiling shall be provided and installed by the Plumbing Contractor and are to be accessible.

(I) Furnishing and installing ventilation fans and ducts.

(J) Hood or ventilator duct work upstream from ceiling or connection position.

(K) Furnishing and installing conduit and wire to the point of rough-in for the equipment including required disconnect switches.

1.04 GUARANTEE

(A) Guarantee all work provided under this contract against defects in workmanship and materials for one (1) year from the date of final acceptance of the completed installation, unless otherwise specified.

(B) If, within any guarantee period repairs or changes are required in connection with guaranteed work, correct all defects therein and make good all damage to the building, equipment, or contents thereof which is the result of the use of materials, equipment or workmanship which are inferior, defective or not in

accordance with the terms of the contract.

(C) In addition, all compressors supplied for refrigeration units either remote, connected, or as an internal part, shall be supplied with the manufacturer's five year extended warranty.

1.05 REFERENCE STANDARDS

(A) Cooking equipment shall conform to the applicable requirements of standard for Vapor Removal from Cooking Equipment, NFPA 96, published by the Protection Association, Boston, MA.

(B) Electrically operated or heated equipment, fabricated or not, shall conform to the standards of the National Underwriters Laboratories, Inc., Chicago, IL.

(C) Welding shall be performed in accordance with the applicable requirements of Structural Welding Code, AWS D1.1, Rev. 2-74, published by American Welding society, Inc. Miami, Fl.

(D) Steam heated equipment shall be manufactured in compliance with and carry the seal of A.S.M.E.

(E) All equipment to be N.S.F.

(F) Walk-in refrigerator and freezer rooms or other 'built-in" pieces of equipment shall be designed, fabricated and installed in strict compliance with the applicable state building codes or the local authority having jurisdiction. This equipment shall also comply with all other applicable codes.

1.06 SUBMITTALS

(A) Submit in accordance with applicable requirements of Division 1, giving all data for the correlation of the work with other trades.

(B) The Food Service Equipment Contractor shall prepare detailed, dimensioned rough in drawings from the Architect's dimensioned plans, not reproduced from the Food Service Contract Documents.

(C) Submittal shall be in the form of a quarter inch scale PDF Document, electronically transmitted.

(D) Make submission to the Architect through the General Contractor within 30 days after the award of contract.

(E) Submit shop drawings of all equipment specified for fabrication detailed to a minimum scale of ¾ inch equals 1'-0". Drawings shall show dimensions, details of construction in relation to adjoining work, reinforcing, anchorage, and other work required for the complete kitchen equipment installation. The cost of

reproduction shall be the obligation of the Food Service Equipment Contractor.

(F) The approval of the shop drawings and schedules by the Architect will be general and shall mean that the Architect has no objections to the use of the materials and processes shown. The Architect's approval shall not relieve the Food Service Equipment Contractor from his responsibility for errors or omissions for any deviation from the contract requirements.

(G) Any discrepancies found by the Food Service Equipment Contractor between the specifications and the drawings, or between drawings, or any contradictory sizes or plate numbers describing the manufacturers' items shall be brought to the attention of the Architect.

(H) Each item of Food Service Equipment shall be the size, shape and type indicated on the drawings and in the specifications. These are the standards of quality to which we have our requirements. For any item noted a substitution may be submitted but only by prior approval before bidding. Any and all substitutions must be approved by the Food Service Consultant and Architect.

(I) Substitutions submitted and approved that have mechanical, plumbing, or electrical characteristics which are different for the drawings and specifications are the responsibility of the Bidder and can be changed only with approval. All costs for changes, if approved, shall be borne by the Bidder.

(J) Submission for prior approval shall be as directed in "Instructions to Bidder" by Architect.

(K) When an item of equipment is submitted for "Prior Approval", a manufacturer's specification sheet or detailed description of the matter in which the prior approval item conforms or varies from the item specified shall be furnished.

(L) Prior approved equipment will not be acceptable unless evidence is presented to the Architect that equipment of approximately the same type and design as that proposed to be furnished has been installed elsewhere and has been operation successfully for at least one year.

(M) The Food Service Equipment Contractor shall assume responsibility as to the quality of the prior approved equipment he proposes, regardless of any approval by the Architect. Should the alternate item prove to be unequal to the originally specified item, the Food Service Equipment Contractor shall replace the alternate item with the originally specified item of equipment at no additional expense to the Owner.

(N) Should the substitution of such equipment require rearrangement in the room or change the rough in and services, a layout of such changes shall be submitted with the shop drawings. Such rearrangement shall result in no additional expense to the Owner.

(O) Each item of Food Service Equipment shall be of the latest model available at the time of the submittal. The Food Service Equipment Contractor shall notify the Architect in writing when he is furnishing a later model than the one specified. Revisions or changes are accomplished at no additional expense to the Owner.

(P) Food Service Equipment furnished on this project shall have local authorized service agencies for the major parts such as compressors, motors, etc.

(Q) Materials shall be new and in excellent condition and materials for similar uses shall be of the same type and manufacturer.

1.07 FIELD DIMENSIONS

(A) All sizes given are approximate and are as accurate as can be determined at this time. Verify all measurements at the building prior to fabrication of equipment. All equipment must conform to the finished building conditions. Where obstructions occur, equipment must be neatly scribed, fitted to and around the same, resulting in a sanitary, homogenous fixture.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

(A) Materials or equipment shall be delivered to the project as required.

(B) Delivery and installation of all equipment, herein after specified, shall include handling and setting in location the various items specified as shown on the drawings, ready for all direct building connections. All equipment shall be manufactured with connections for water, waste, electricity, ventilation, etc., as shown on the rough-in plan.

1.09 TESTING AND REGULATIONS

(A) Test, regulate and demonstrate to the Owner or his representative that all equipment is operating properly.

(B) Provide instructions in the use of all equipment.

1.10 REQUIREMENTS OR REGULATORY AGENCIES

(A) Complete compliance with legally constituted authorities having jurisdiction, including all applicable portions of the National Fire Association Pamphlet 96, latest edition, General Industry Safety Orders, Public Health Services, State Fire Marshall, Local and State Building codes and Ordinances.

(B) Provide and install wheel chocks, restraining devices and splashguards, as required by the State Fire Marshall

1.11 COORDINATION

(A) The Food Service Equipment Contractor shall cooperate with and coordinate work with the other trades on this project and verify measurements at the building. No extra charges will be allowed for any difference between the actual field measurements and the measurements indicated on the drawings.

(B) It will be required that all fabricated equipment such as food serving units, tables, sinks, etc., described in the following specifications, other than by name and catalog numbers, be manufactured by a kitchen equipment fabricator who has the plant personnel, and engineering facilities to properly design, detail and manufacture kitchen equipment in accordance with these specifications. The manufacturer of such equipment shall be subject to the approval of the consultant, Mise en Place Design, LLC.

(C) The contractor for the work of this Section shall have the experience of detailing, fabrication and installing food service equipment for at least five (5) years prior to the awarding of the contract for the work of this Section.

1.12 MANUFACTURER'S INSTRUCTIONS

(A) Follow each of the manufacturer's directions where the manufacturer of an item of equipment used in this project furnishes directions or prints covering points not indicated on the drawing or called for in the specifications.

1.13 RECORD DRAWINGS

(A) In accordance with the applicable requirements of division 1, General Requirement "as built" record drawings shall be kept up to date as the work progresses. This shall not be construed as an authorization for the Food Service Equipment Contractor to make changes in the approved layout without definite instructions in each case. Final "as built" drawings are to be provided by the Food Service Equipment Contractor after completion of the project.

1.14 OPERATING AND MAINTENANCE INSTRUCTIONS

(A) Upon completion of the installation, the Food Service Equipment contractor shall present to the Owner two (2) sets of operation and maintenance manuals covering mechanically operated equipment. This manual shall be bound in a durable loose-leaf binder.

(B) The front of the manual shall list names, addresses and telephone numbers of the local service companies for those items having mechanical and electrical components that may need servicing.

1.15 INTENT OF DOCUMENTS

(A) Review and verify the completeness and correctness of the bid documents before bidding. The Food Service Equipment Contractor shall notify the Architect in the prescribed manner of any omissions or discrepancies. The lack of such notification shall be construed as complete acceptability of the documents and as waiving rights to future claims arising from omissions or discrepancies.

1.16 PROGRESS SCHEDULE

(A) The Food Service Equipment Contractor shall comply with the progress schedule established by the General Contractor and to order his work so that there will not be any interference with the work of others or delay in their schedule.

1.17 CHANGES IN THE WORK

(A) The Architect reserves the right to require the Food Service Equipment contractor to make reasonable modifications in the routing of work and relocation of equipment. This specifically refers to conditions where interference occurs or where more desirable accessibility can be obtained or where material cannot be installed because of structural or mechanical conditions encountered. Such work will be at no additional expense to owner.

1.18 FIELD REPRESENTATIVE

(A) The Food Service Equipment Contractor shall provide a competent field representative to verify rough-ins, field dimensions, equipment access, coordination with GC, and be present during installation. The representative shall be well informed as to all phases of the work and shall instruct the respective trades on connection details so as to achieve the best possible installation.

PART 2 PRODUCTS

2.01 MATERIALS

(A) Materials used in the fabrication of this work shall be new and the best grade obtainable of their respective type and shall be finished so as to be easily cleaned, resistant to wear, denting, pitting, chipping, and/or grazing, and shall withstand penetration of vermin and corrosive action of foods and compounds. **Approved stainless steel fabricators are: D&S Custom Stainless, FSF Custom Stainless and EMJAC.**

(B) Stainless steel fabrication shall be type 304 extra low carbon, non-magnetic, Austenitic 18% chrome, 8% nickel corrosion resistant alloy steel. Sheets shall

be flat, free of all buckles and surface imperfections.

(C) Stainless steel pipe and tubing shall be seamless or welded of gauge specified and of true roundness.

(D)

Tops	14 gauge stainless steel
Legs	16 gauge stainless steel
Sinks	14 gauge stainless steel
Support Channels	14 gauge galvanized iron
Undershelves	16 gauge stainless steel
Unexposed Body	18 gauge galvanized steel
Over shelves	16 gauge stainless steel
Flanged feet	10 gauge stainless steel
Body	18 gauge stainless steel

(E) Unless otherwise specifically called for herein, no material lighter than 20 gauge shall be incorporated into the work.

(F) Stainless steel pipe and tubing shall be seamless of gauge specified and of true roundness. Seamless tubing shall be thoroughly and correctly annealed, and ground smooth. All cross bracing and undershelves shall be welded to legs, not bolted.

(G) Welded tubing shall be thoroughly heat treated smooth.

(H) Welded tubing shall be thoroughly heated and properly quenched to eliminate precipitation, drawn true to size and roundness and polished to match stainless steel sheets.

(I) Structural steel members used for framing consisting of angle, bars, channels, etc., shall be ductile in quality, free of hard spots, runs, checks, cracks, and other surface defects. They shall be smooth and galvanized by the hot dip process with all surplus removed and free of runs, blisters, excess spelter and uncoated spots or patches. Cut edges are to be coated with epoxy or other approved material.

(J) White metal shall consist of corrosion resistant metal containing not less than 30% nickel. Castings shall be rough ground, polished, buffed to bright luster, free from pit marks, runs, checks, burrs and other imperfections. In lieu of white metal castings, 18-8 stainless steel die stamped, or casting will be acceptable.

2.02 METAL TOPS AND WORK SURFACES

(A) Metal tops and work surfaces shall be ground polished stainless steel.

(B) Sound deadening to be applied to underside of all work surfaces to be

Component Hardware #Q75-2500 or equal.

2.03 SINKS

(A) Construct sinks to the gauges and sizes specified in item specifications scheduled in Section 2.01 hereinafter or as specified on the contract drawings.

(B) Construct sinks integral with the drainboards or tabletops in which the sinks

(C) Where one or more sink compartments are adjacent, the partitions shall be double thickness, continuously welded where the sheets join at the top; crease the bottom of each compartment to insure complete drainage to the waste opening.

2.04 DRAINBOARDS AND DRAINTABLES

(A) Form drainboards and drain tables integrally with the sinks in the same unit, be of the length and width specified or indicated on the drawings and be sloped to the sink 1/8" (3mm) per foot (25mm).

(B) Unless otherwise indicated, the rims of the drainboards shall be 1-1/2" (38mm) x 205 degree rolled rims depressed 1/2" (13mm) with exterior corners bullnosed.

(C) Cross brace legs and stainless steel undershelves shall be welded.

2.06 ENCLOSED CABINET BODIES

(A) Construct the enclosed cabinet body formed with a minimum of 18 gauge steel sheets reinforced with steel sections to create a rigid structure.

(B) The body shall be of welded construction throughout with front rails, mullions, etc., welded to appear as one-piece construction.

(C) Close vertical channel sections.

(D) Fabricate exposed interior and exterior sections of stainless steel unless specified otherwise.

(E) Fabricate unexposed sections of galvanized steel unless specified to the contrary.

2.07 DRAWERS

(A) Drawers shall be of 20 gauge stainless steel removable pan type, supported on a 14 gauge stainless steel all welded drawer cradle with a stainless steel front. All vertical and horizontal corners shall have a 3/4" minimum coved radius.

(B) Provide the drawer front with a continue stainless steel pull.

(C) Support the drawer cradle with stainless steel roller bearing slides with stops mounted to make the drawers self-closing.

(D) Enclose drawers under open tables with stainless steel housing secured to the underside of the table.

(E) Construct slides to permit each drawer to be pulled out at least 2/3's of its length and support heavy loads without deflection.

(F) The drawer cradle shall be removable without tools.

(G) Drawers shall be positioned so they are a minimum of 2" recessed from front of table edge.

2.08 DOORS

(A) Construct doors with double pan construction of 18 gauge stainless steel, having corners welded, ground and polished. Insulate between pans with Celotex board. Tack weld the pans together.

(B) Polish the exterior and interior of the doors.

(C) The doors shall be 7/8" (22mm) thick, and fitted with continuous stainless steel pull, matching those specified for drawers and have rubber bumpers.

(D) Fit sliding doors on top with ball-bearing, quiet sheaves in 14 gauge stainless steel overhead tracks and be removable without the use of tools.

(E) Hinged doors shall be the flush type mounted on heavy duty concealed hinges of approved design and fitted with magnetic catches.

(F) Install strike plate on the fixture body so as not to interfere with the use of the shelf area.

2.09 SHELVING

(A) Construct shelving in the counters or cabinets of 16 gauge stainless steel unless otherwise specified.

(B) Turn down the front edge of the intermediate shelves 1 1/2" (38mm) and then back.

(C) Turn backsides up and feather slightly to form a tight fit to the enclosure panels.

(D) Construct shelves of open base tables with 16 gauge stainless steel, the front end sides being flanged down 1 1/2" (38mm) with rear up 4" (51mm).

2.10 HARDWARE AND LOCKS

(A) The hardware shall be of chromium-plated cast brass, except when specified to the contrary. Stampings shall not be used.

(B) Identify the hardware with the respective manufacturer's name and number.

(C) Fit doors for reach-in refrigerated compartments with magnetic type latches and cylinder locks, keyed alike or separately as specified.

(D) Fit the drawers and doors with cylinder-type locks, keyed alike and in separate groups as directed. Locks should be left off unless needed.

(E) Provide master keys to open all locks in every department.

2.11 FAUCETS AND WASTES

(A) All prep and pot sinks shall be fitted with twist lever waste valves (T&S or equal) and stainless steel strainers. Overflows shall be included for pot sinks.

2.12 TRIMMING AND SEALING

(A) All equipment that rests on concrete masonry bases shall be set, leveled, and sealed as required by Health Department Codes.

(B) All equipment butting walls shall be scribed and sealed to the walls with a silicone rubber sealant (Dow Corning 780, General Electric Series SE12 or approved equal). Where there is any vertical or horizontal gap larger than 1/8" it shall be trimmed with finished stainless steel closures at no extra cost.

(C) Where two or more pieces of equipment join, the seam shall be sealed with a silicone rubber sealant (Dow Corning 780, General Electric Series SE1200 or approved equal).

(D) Hi-Temp silicone sealant, or equal to be used at joints between pieces of heat producing equipment.

(E) Ends of all back splashes and hollow sections shall be closed during fabrication.

(F) Trim is acceptable-applied required to cover applicable joints.

(G) Trade Marks: Trade Marks and the name of the fabricator shall not be fastened to any items of fabricated equipment.

PART 3 CONSTRUCTION

3.01 CONSTRUCTION AND WORKMANSHIP

(A) Construct each piece in a workmanlike manner to include all necessary reinforcing, bracing, and welding; and the proper number and spacing of uprights and crossmembers for strength as set forth in the standard drawings and specifications and for the heavy duty commercial use intended. Wherever size permits, equipment shall be fabricated of a single sheet of metal. Equipment not braced in a rigid manner which is subject to rattle, wobble, or tin-canning will not be acceptable.

(B) Exposed surfaces shall be free from bolt, screw and rivet heads, when bolts are required they shall be of concealed type and be of similar composition as the metal to which they are applied. Where bolt or screw heads on the interior of fixtures are visible or may come in contact with hands or wiping of cloths, they must be capped with an acorn nut with lock-washer.

(C) Welding shall be done by the Heliarc method unless the Contractor has received written permission to use another but similar method. Where filler rods are used, they should be of the same or higher grade composition as the materials to be joined and contain a flux to minimize carbide precipitation. Welds shall be complete, strong, and ductile, sound, non-porous, free of pits, cracks, and other mechanical imperfections. Excess metal shall be ground off, finished smooth and polished creating one homogenous fixture of like color and finish, to prevent possible corrosion. Welded stainless steel joints shall be ground smooth and polished. In no case shall soldering be considered as a replacement for welding, nor shall any soldering operation be done where dependence is placed on strength and stability of joint or fixture proper.

(D) In general, shop fabricated fixtures of one piece construction, shall be shipped to the job completely assembled. Equipment too large to transport or enter the building as one piece shall be constructed so that welded field joints can be made at the job site.

(E) Suitable pipe slots shall be provided throughout all undershelves to accommodate necessary service lines. These slots shall be of proper size and shall be neatly made with turned up edges on all four sides to eliminate cutting or defacing of equipment on job. Cabinet bodies shall be provided with an inner panel duct at ends or rear of cabinet to allow vertical pipe space to conceal the vertical piping.

3.02 FINISHES

(A) Stainless steel where exposed shall be ground polished to a #4 commercial finish. Where unexposed, finish may be #2B. The grain of polishing shall run the same direction on all horizontal and vertical surfaces of each item of equipment where possible.

(B) Exterior galvanized parts, exposed members of framework and wrought steel pipe where specified, to be cleaned, properly primed with rust inhibiting primer,

degreased, and finished with two (2) coats epoxy based Hammertone paint.

3.03 GRINDING, POLISHING, AND FINISHING

(A) Exposed welded joints shall be suitable ground flush with the adjoining materials and neatly finished to harmonize there in with. Wherever material has been sunken depressed by a welding operation such depressions shall be suitable hammered and penned flush with adjoining surfaces consistent with good workmanship. In all cases the grain of rough grinding shall be removed by a successive fine polishing operations.

(B) Nonexposed welded joints on undersides of tables or counters of stainless steel construction shall be suitably coated at the factory with a metallic based paint to prevent possible corrosion at such locations.

(C) After galvanized iron members have been welded, welds and areas where galvanizing has been damaged shall be coated by the Amco galvanizing stick #322 process, as manufactured by the American Solder and Flux Company, Philadelphia, PA., or approved equal. The treated areas shall be thoroughly washed with hot water after the application to remove flux residue.

(D) Butt joints and contact joints, wherever they occur, shall be close fitting and shall not require solder as a filler. Wherever break bends occur they shall be free of undue extrudence and shall not be flaky, scaly, or cracked in appearance and where such breaks do mar the uniform surface appearance of the material, all such marks shall be removed by suitable grinding, polishing, and finishing. Wherever sheared edges occur, they shall be finished to alleviate all danger of cutting or laceration when the hand is drawn over such sheared edges. In no case are over-lapping materials to be acceptable where miters or bullnosed corners occur.

(E) The grain of polishing shall run in the same direction on all horizontal and all vertical surfaces of each individual item of fabricated equipment, except in the case where table or sink tops join at right angles where finish of the horizontal sections of each terminating in mitered edges shall be acceptable. Where sinks and adjacent drainboards are equipped with backsplashes, the grain of polishing shall be consistent in direction throughout the length of the back splash and sink compartment.

(F) Where stainless steel surfaces are disturbed by the fabricating process, such surfaces shall be finished to a fine satin finish.

3.04 FASTENING

(A) Bolts, screws, nuts and washers shall be of stainless steel, except where brass or stainless steel is fastened in which case they shall be brass or stainless steel respectively. Where dissimilar metals are fastened, bolts, screws, nuts, and washers shall be of the highest grade metal. The spacing and extent of bolts, and

screws shall be such as to insure suitable fastening and prevent buckling of the materials fastened.

3.05 INSULATION

(A) For low temperature applications, such as ice bins, cold pans, or fabricated undercounter freezers use urethane rigid board, foam, or foamed-in-place, not less than 2" thick, except that vertical surfaces of cold pans and ice bins may be 1" thick. Bond insulation at joints to prevent condensation on exterior.

(B) For normal temperature applications such as fabricated undercounter refrigerators, use Styrofoam material 2" thick bonded at joints.

(C) For heated applications such as plate warmers, use block-type rock wool, minimum 1" thick.

(D) For countertops subject to heat from cooking equipment and/or refrigeration compressors, use 1" thick Johns Manville Marinite 36, or equal to insulate underside of top.

(E) Add marinite material between freezer or refrigerator and 14 gauge stainless steel top.

3.06 MISCELLANEOUS

(A) Food Service Equipment Contractor is directed to refer to Kitchen Facilities Drawings and is specifically directed to the Kitchen Facilities Spot Connection Plans for additional information regarding necessary appurtenances to accommodate plumbing, electrical, and refrigeration, etc., rough-in.

3.07 MILLWORK FABRICATION

(A) The construction and installation of millwork shall be as indicated on the drawings and shall conform to the requirements of the Architectural Woodwork Institute (AWI) Standards for "Custom Grade Work".

(B) Moisture content of lumber, plywood and millwork shall not exceed 10%.

(C) Millwork and materials shall conform in all respects to local codes for fire retardant treatments.

(D) Plywood shall be Douglas Fir or Birch of the thickness indicated on the drawings or required, good one or both sides as conditions require.

(E) Wherever laminated plastic materials are specified for cabinet work, they shall be Formica, Textolite, Wilsonart, Laminart, Nevamar, or as approved by the by

the Architect. Laminate materials to close-grained plywood or selected smooth sanded stock to insure a ripple free surface. Place top sheet on and over finished edge. Cover corresponding backs with approved backing and balancing sheet materials.

(F) Apply plastic laminate with the grain running vertically unless otherwise specified or approved.

3.08 UTILITY SERVICE REQUIREMENTS

(A) Electrical: The Food Service Equipment Contractor shall furnish equipment complete with internal wiring chases where electrical services are required.

(B) Food Service Equipment Contractor shall provide adequate raceways and accesses in fixtures for this work. Where the Food Service Equipment Contractor fails to provide for such space, he shall correct his work without expense to the Owner. Cutting and patching required by such work shall be reworked to its original finish.

(C) Food Service Equipment contractor shall coordinate his work with the Electrical Contractor so that the receptacles provided will match the specific plugs installed as part of the plug-in equipment. Any changes in cords and plugs required in the field due to lack of coordination between the Electrical and Food Service Equipment Contractors will be the latter's responsibility. Food Service Equipment length of cords furnished with the specified equipment to be a suitable or appropriate length, so they do not interfere with other equipment.

(D) The Food Service Equipment Contractor shall supply each motor driven appliance or electrical heating unit suitable control switch or starter of proper type and in accordance with the Underwriters Code wherever such equipment is not built-in. Other line switches, safety cut-outs, control panels, fuse boxes, other controls, fittings and connections, when not an integral part of this unit, will be furnished and installed by the Electrical Contractor, unless otherwise specified.

(E) It shall be the responsibility of the Food Service Equipment Contractor as part of the work included under this division of the specifications to insure that equipment furnished under this contract shall be so wired, wound or constructed as to conform with the characteristics of electrical and other services at the premises.

(F) Appliances shall be new of manufacturer's current production and furnished complete with motors, driving mechanisms, starter and controllers, timers cut-outs, reversing mechanism and other electrical equipment, if and as applicable. Wiring and connection diagrams shall be furnished with electrically operated machines and for electrically wired fabricated equipment.

(G) Appliances shall be of rigid construction, free from objectionable vibrations. Quietness of operation of food service equipment is a requirement and Food Service Equipment Contractor will be required to remove or repair any equipment producing objectionable noise and/or vibration.

(H) Motors shall be of the drip-proof, splash proof, or totally enclosed type, having a continuous duty cycle and ball bearings except small timing motors which may have sleeve bearings. Motors located where subject to deposit of dust, lint, or other similar matter from the machine on which installed shall be of the totally enclosed type. Motors shall have windings impregnated to resist moisture. Motors shall have ample power to operate the machine for which designated under full load operating conditions without exceeding their name plate ratings. Horsepower requirements on driven equipment shall be determined by the manufacturer, based on normal operation at maximum capacities. The normal rated motor horsepower shall not be less than the horsepower required for normal operation of the equipment at maximum capacity.

(I) Electrical components are to be U.L. approved and wiring is to be in accordance with the National Electrical Code or in effect at the job site, whichever is the greater. Furnish and install cover plates on electrical outlets, receptacles, switches, etc., furnished by Food Service Equipment Contractor and shall match the material and finish of the equipment to which they will be fastened.

(J) Food Service Equipment Contractor to furnish interior light fixtures for walk-in coolers and freezers.

(K) Electrical Contractor to wire circuits from exhaust ventilator control panels, fire protection systems, and to exhaust fan controls.

3.09 PLUMBING

(A) Locate water inlets above the positive water level to prevent siphoning of liquids into the water system. Wherever conditions shall require
submerged inlet, suitable type check valve and vacuum breaker shall be placed on the fixture to form part of same to prevent siphoning. Chrome plate exposed piping and fittings.

(B) Necessary faucets shall be furnished by the Food Service Equipment contractor with his equipment and shall be supplied with replaceable monel seals, non-splash aerator, and unless otherwise specified will be as manufactured by T&S Brass and Bronze Works, Inc. and Fisher Manufacturing Company.

(C) The Food Service Equipment Contractor shall provide suitable pipe slots and/or do all drillings, punching, and cutting of his equipment required to provide access for mechanical connections and/or runs. Such work when performed at the job site shall be of the same quality as similar work performed in the shop.

(D) So as to insure proper clearance for cleaning, horizontal piping lines shall run at

the highest possible elevation and not less than six (6) inches above the floor, through equipment wherever possible.

(E) No exposed piping about fixtures or in other conspicuous places shall show tool marks or more than one thread at the fitting.

3.10 STEAM

(A) Furnish and install special pressure regulators, steam trap assemblies, control valves, pressure gauges, strainers and other devices required for the proper operations of steam operated equipment. Interconnect devices and make ready for final connection.

(B) Furnish and install steam thermostats, where required, on steam-heated or steam-operated equipment.

(C) Furnish and install pressure regulators for all items of steam-operated equipment, where required.

3.11 REFRIGERATION

(A) Refrigeration systems shall include start-up and one (1) year service plus additional four (4) year manufacturer's warranty on all compressors.

(B) Cold pans, refrigerated pans and cabinets shall be provided with breaker strips where adjoining top or cabinet face materials to prevent transfer of cold.

(C) Adequate air supply and exhaust shall be provided for self-contained refrigeration condensing units, both fabricated and standard, as required for proper operation. If in the opinion of the Food Service Equipment Contractor, additional ventilation is required to ensure correct operation temperatures, he shall so state to the Architect in writing of his evaluation and decision before installation.

(D) Refrigerators and freezers having remote refrigeration system shall be complete with thermostatic expansion valves at the evaporator. Expansion valves shall match the refrigeration and electrical requirements of the remote condensing units.

(E) Refrigerated compartments, fabricated and standard, shall be fitted with flush digital thermometers. Thermometers shall be adjustable and calibrated after installation.

(F) Where remote refrigeration systems are indicated, such as for walk-in coolers, freezers, and reach-in refrigerators and freezers as well as fabricated

requirements, it is the intent of these specifications that complete and operating system be supplied and installed to the highest standards for this type of work. Required racks are to be provided for mounting condensers and controls. Where needed, provide removable weather-proof covers.

(G) Refrigerator hardware shall be heavy duty. Hinges shall be self-closing and latches shall be magnetic edge mount-type unless specified or detailed otherwise.

3.12 REFRIGERATION REQUIREMENTS (REMOTE)

(A) Provide and install the following:

(1) Vibration absorbing mountings for condensing units and suction lines.

(2) Disconnect switches, automatic starting switches, motor protectors and pressure limit switches all enclosed and with interconnection wiring, factory installed, ready for line connections.

(3) Thermostats, solenoids, pressure control, liquid line sight glass, and dryer of ample capacity. Extended probes to terminate at coil and be installed in such a manner that wires are hidden

(4) For Government projects, Refrigerant lines shall be type "L" hard (required for government jobs only) copper with "Silfos" brazed joints. Installation locations of lines shall be coordinated with jobsite superintendent. All refrigeration piping shall be properly supported by adjustable hangers spaced and adjusted to the drop required.

(5) A heat exchanger for each evaporator.

(6) A thermostatic expansion valve for each evaporator.

(7) A full charge of appropriate refrigerant and oil for each system per the manufacturer specifications.

(8) Start-up adjustment and one (1) year free warranty service. Five (5) year warranty on motor compressor units.

(9) Where refrigerant suction lines are trapped, use next size smaller pipe in vertical portion of the trap than that indicated so as to acquire sufficient gas velocity for proper air return.

(10) All refrigerant lines shall be insulated their full length with anti- sweat pipe covering of 3/4" Armaflex or equal. If refrigerant lines are in air return plenum areas, insulation as required by local code shall be used. Metal pipe sleeves shall be provided by the General Contractor where

piping passes through a wall, ceiling or floor.

(11) Provide 1/2" copper drain tubing from drain pans below coils to drains, furnished and installed by system installer. Exterior exposed lines to be chromed Drain line from freezer coil shall be wrapped with heat cable as required.

(12) Electrical Contractor shall provide and install the main power to each disconnect and shall also interwire power from the defrost time clock to the freezer blower coil. Control and thermostat wiring shall be included as part on electrical contract.

(13) The Supplier will be required to supervise and instruct the Electrician in their work of connection. Units shall comply in all respects to design drawings and any discrepancies noted during the bidding process shall be immediately noted to the Consultant for interpretation and action. No extras will be considered after the bidding process for not following the above procedures.

(B) WALK-IN REFRIGERATION ROOMS

(1) The supplier shall hire a licensed, local refrigeration company and supervise the installation of the walk-in boxes.
(2) The supplier shall coordinate with the GC the necessary floor recesses, depths and flooring thickness to ensure proper installation.
(3) The panels shall be erected and assembled on a level surface in accordance with the manufacturer requirements.
(4) Extended probes are to be run external of the panels and are to terminate at the evaporator coil.
(5) Doors to be adjusted to ensure self-closing, all packing materials and adhesives to be removed from the walk-in upon completion of installation.

Walk-ins are to be running and adjusted a minimum of 24 hours prior to the loading of product. Freezers are to be cooled down in stages over a 12 hour period to –10 º F.

PART 4 EXECUTION

4.1 OPENING ACCESS

(A) Coordinate with other contractors for provision and scheduling of temporary openings in walls or floors which may be required for passing large sections of equipment into the building that cannot be accommodated through permanent openings.

4.2 INSTALLATION

(A) General: Make arrangements for receiving food service equipment and make delivery into the building as requisitioned by installation superintendent. Equipment shall be delivered only after the building is weather and vandal safe.

(B) Deliver all equipment into the building, uncrate, assemble, level and repair any damaged or abraded surfaces. Set equipment temporarily in its final location to permit mechanical trades to take necessary measurements for the connection of the service lines. Move the equipment sufficiently to permit the installation of such service lines and anchoring devices and then realign equipment level and plumb. Install all equipment so as to eliminate objectionable vibration. Clip all prep tables and dish tables to walls with Z-clips, and Silicone seal all stainless steel tables to walls using waterproof white or clear heavy duty sealant.

4.3 CLEANING

(A) At all times, keep the premises free from accumulations of waste materials and rubbish caused by the work.

(B) Wrapping and protective coverings shall remain on all items until installation is complete and job is ready for cleaning.

(C) Clean all equipment items provided under this contract prior to inspection and acceptance of the work.

PART 5 BIDDING

(A) Bids shall consist of itemized prices, including costs for freight, installation, and taxes.

PART 6 WARRANTY SERVICE

The Food Service Equipment Contractor shall, for a period of one year, provide the owner with warranty service during business hours (8:30-5:00) for all food service equipment installed. He shall dispatch service calls to the appropriate manufacturer's authorized service agents and ensure service is performed and completed within 24 hours. He shall maintain logs and records of all service calls, completion dates, serial numbers, parts replacement and any other service-related information.

ITEMIZED SPECIFICATIONS

MAIN KITCHEN

ITEM K01 -AIR CURTAIN (1 REQ'D)
Berner Model CHD10-2072A
Commercial Series High Performance Air Curtain, 72" long, unheated, (2) 1/2 hp three speed motors, for door height up to 10-feet high, indoor mounting only, cULus, MADE IN USA
1 eaFive year parts warranty (unheated units)
1 eaModel A 120v/60/1-ph
1 eaModel 9503SD025-PR-A Plunger/Roller Door Switch, NEMA 1, max. amp draw of 20 amps, 120-240v/1ph
1 eaAdditional roller switch
1 eaWhite aluminum housing

ITEM K02 -CAN RACK (1 REQ'D)
Advance Tabco Model CR10-162M Dimensions: 69.75(h) x 24.75(w) x 35.13(d)
Can Rack, mobile design with casters, with sloped glides for automatic can retrieval, designed for #10 & #5 cans, aluminum construction, holds (162) #10 cans, or (216) #5 cans

ITEM K03 -DRY STORAGE SHELVING (1 lt REQ'D)
Metro Model EPOXY
One lot dry storage shelving, 74" high, four tier, size and configure per plan layout.

ITEM K04 -WALK-IN COOLER (1 REQ'D)
American Panel Corporation Model CUSTOM
8'6" high, floorless, with white interior, two 48" LED light, inset door with 3rd hinge, IC Plus temperature monitoring system, 14" x 14" heated vision window, 36" dtp kickplates on door, and 60" on exposed exterior, strip curtain, 25' extended probe, matching vertical and horizontal trim and closures to walls and ceiling.

ITEM K05 - COOLER EVAPORATOR COIL (1 REQ'D)
American Panel Corporation
BOHN

ITEM K06 - COOLER CONDENSING UNIT (1 REQ'D)
American Panel Corporation

Preassembled remote medium temperature condensing unit with winter controls, UL listed 18" high stand and cover.

ITEM K07 -WALK-IN COOLER SHELVING (1 lt REQ'D)
Metro Model EPOXY
One lot walk-in cooler shelving, 74" high, four tier, size and configure per plan layout.

ITEM K08 -BUN / SHEET PAN RACK (2 REQ'D)
Advance Tabco Model PR18-3W Dimensions: 63.25(h) x 20.25(w) x 26(d)
Pan Rack, mobile, full height, end loading, 20-1/4"W x 26"D x 63-1/4"H, (18) 18" x 26" sheet pan capacity, slides on 3" centers, open sides, all-welded aluminum construction, 5" swivel casters, NSF

ITEM K09 -WALK-IN FREEZER (1 REQ'D)
American Panel Corporation Model CUSTOM
8'6" high, reinforced floor with interior ramp and dtp overlay, with white interior, one 48" LED light, heated 14" x 14 vision window, IC Plus temperature monitoring system, 25 ft extended probe, flush mounted door with 3rd hinge, 36" dtp kickplates on door, matching vertical and horizontal trim to ceiling and walls.

ITEM K10 - FREEZER EVAPORATOR COIL (1 REQ'D)
American Panel Corporation
BOHN

ITEM K11 - FREEZER CONDENSING UNIT (1 REQ'D)
American Panel Corporation
Preassembled remote low temperature condensing unit with winter controls, UL listed, 18" high stand and cover.

ITEM K12 -WALK-IN FREEZER SHELVING (1 lt REQ'D)
Metro Model EPOXY
One lot walk-in freezer shelving, 74" high, four tier, size and configure per plan layout.

ITEM K13 -DUNNAGE RACK (2 REQ'D)
Metro Model HP2248PD Dimensions: 12(h) x 48(w) x 22(d)
Metro Bow-Tie™ Dunnage Rack, 22" x 48" x 12"H, slotted, with separate polymer tie for joining racks, corrosion proof polymer construction, NSF

ITEM K14 -SPARE NO. <Spare No.>

ITEM K15 -SPARE NO. <Spare No.>

ITEM K16 -CLEAN DISH/PAN SHELVING (1 lt REQ'D)
Metro Model EPOXY
One lot clean dish/pan shelving, 74" high, four tier, size and configure per plan layout
ITEM K17 -THREE (3) COMPARTMENT SINK (1 REQ'D)
Advance Tabco Model 94-23-60-24RL Dimensions: 45(h) x 115(w) x 28(d)
Regaline Sink, 3-compartment, with left & right-hand drainboards, 20" front-to-back x 20"W sink compartments, 14" deep, with 11"H backsplash, stainless steel legs with adjustable left-to-right and front cross rails, 24" drainboards, 1" adjustable bullet feet, 14 gauge 304 stainless steel, overall 28" F/B x 117" L/R, NSF
3 eaModel K-15 Lever Waste Drain, twist handle operated with built in overflow, fits 3-1/2" drain opening, 2" NPT & 1-1/2" IPS outlet connections
3 eaModel K-4 Support Bracket, for lever waste drain handle, (1) support required for each lever drain
3 eaModel K-476 Punch hole for overflow drain, (1) punch required for each overflow drain, (please specify make & model of overflow used) (required for overflows unless using K-15)
1 eaModel K-454 Side splash, integral (welded), right side

ITEM K17.1 - WALL / SPLASH MOUNT FAUCET (1 REQ'D)
Fisher Model 13210
Faucet, backsplash mount, 8" centers, 16" swing spout, lever handles with color coded indexes, 1/2" inlets, brass, ADA Compliant

ITEM K18 -OVERSHELF (1 REQ'D)
Advance Tabco Model PS-12-108 Dimensions: 12(h) x 108(w) x 12(d)
Shelf with Pot Rack, wall-mounted, 108"W x 12"D, 18/430 stainless steel shelf, 2" x 1/4" stainless steel pot rack, includes: (9) plated double pot hooks (units 96" & longer have (3) support brackets), NSF

ITEM K19 -MOBILE TRASH CANS

By owner

ITEM K20 -WORK TABLE (1 REQ'D)
Custom Model CUSTOM

S/s worktable with partial s/s undershelf, 9'0" x 30", 20" x 20" s/s drawer and five inch rear splash.

ITEM K21 -INGREDIENT BIN (3 REQ'D)
Cambro Model IBS27148 Dimensions: 28(h) x 16.31(w) x 29.63(d)
Ingredient Bin, mobile, 27 gallon capacity, 1-pc seamless polyethylene bin, 2-pc sliding polycarbonate lid, scoop holder included (scoop sold separately), (4) 3" heavy duty casters (2 front swivel, 2 fixed), white with clear cover, NSF
3 eaModel SCP12CW135 Camwear® Scoop, 12 oz., polycarbonate, clear, NSF
3 eaModel IBSH24148 Ingredient Bin Scoop Holder, 24 oz, white

ITEM K22 -SHELVING, WALL MOUNTED (1 REQ'D)
Advance Tabco Model WS-12-72-16 Dimensions: 10.5(h) x 72(w) x 12(d)
Shelf, wall-mounted, 72"W x 12"D, 1-5/8" bullnose front edge, 1-1/2"H rear up-turn, 16/304 satin finish stainless steel, NSF

ITEM K23 -FOOD SLICER, ELECTRIC (1 REQ'D)
Globe (Middleby) Model G12 Dimensions: 21(h) x 24(w) x 27(d)
Food Slicer, manual, 12" diameter knife, extended chute and end weight accommodates 10-1/2"H product, pyramid-shaped end weight teeth & gripping teeth on underside of end weight, top mounted knife sharpener, belt-driven, ball bearing chute slide, attached knife ring guard, knife cover interlock, removable slice deflector, power indicator light, motor overload protection with manual reset, anodized aluminum construction, non-slip rubber feet, 1/2 HP, 115v/60/1-ph, 3.0 amps, cord, NEMA 5-15P, cETLus, ETL-Sanitation
1 ea2 year parts & labor warranty

ITEM K24 -HAND SINK (4 REQ'D)
Advance Tabco Model 7-PS-50 Dimensions: 13(h) x 17.25(w) x 15.25(d)
Hand Sink, wall mounted, 14" wide x 10" front-to-back x 5" deep bowl, 20 gauge 304 stainless steel, with heavy duty splash mounted gooseneck faucet, lever drain with overflow, P-trap, wall bracket, NSF, cCSAus
4 eaModel K-316-LU Wrist Handles

ITEM K25 -PREP TABLE (1 REQ'D)
Fabricated Model CUSTOM
S/s prep table, 7'0" x 30", with 20" x 20" x 14" deep prep sink with lever waste, s/s undershelf and five inch rear splash.

ITEM K25.1 - DECK MOUNT FAUCET (1 REQ'D)
Fisher Model 33130
Faucet, deck mount, 8" centers, 12" swing spout, lever handles with color coded

indexes, 1/2" male inlets, brass, ADA Compliant
1 ea4 year warranty against defects in materials or workmanship

ITEM K26 -CAN OPENER (1 REQ'D)
Edlund Model S-11
Can Opener, manual, 16" bar length, dishwasher safe, rust proof, stainless steel, with cast stainless steel base, NSF certified
1 ea5 year limited warranty

ITEM K27 -SHELVING, WALL MOUNTED (1 REQ'D)
Advance Tabco Model WS-12-36-16 Dimensions: 10.5(h) x 36(w) x 12(d)
Shelf, wall-mounted, 36"W x 12"D, 1-5/8" bullnose front edge, 1-1/2"H rear up-turn, 16/304 satin finish stainless steel, NSF

ITEM K28 -POT RACK (1 REQ'D)
Advance Tabco Model SW-48 Dimensions: 12(h) x 48(w) x 12(d)
Pot Rack, wall-mounted, double bar design, 48"W x 12"D, constructed of 1/4" x 2" stainless steel, includes: (12) plated double pot hooks, NSF

ITEM K29 -PLANETARY MIXER (1 REQ'D)
Univex Model SRM20+ Dimensions: 35.75(h) x 19.25(w) x 27.38(d)
Food Mixer, countertop, 20 quart capacity, variable speed drive, includes removable SwingRing safety guard, stainless steel bowl, batter beater, wire whip, dough hook, and bowl scraper, 1/2 hp, cETLus, NSF, Made in USA
1 eaTwo-year, on-site parts & labor warranty, see model "WARRANTY SHEET" for details
1 ea115v/60/1-ph, 10.6 amps, NEMA 5-15P
1 eaMetallic silver

ITEM K30 -EQUIPMENT STAND, FOR MIXER / SLICER (1 REQ'D)
Advance Tabco Model MT-SS-302 Dimensions: 24(h) x 24(w) x 30(d)
Equipment Stand, 24"W x 30"D x 24"H, 14/304 stainless steel top, 18 gauge stainless steel adjustable undershelf & legs, adjustable stainless steel bullet feet, NSF
1 stModel TA-25ES Casters, 5" diameter, set of 4 (2 with brakes)

ITEM K31 -CABINET, ENCLOSED, BUN / FOOD PAN (1 REQ'D)
Cambro Model 1826DTC401 Dimensions: 63.75(h) x 33.25(w) x 21.5(d)
Camcart®, double cavity for trays & sheet pans, 33-1/4"W x 21-1/2"D x 63-3/4"H, (24) tray support rails on 1-15/16" centers, polyethylene, foam insulation, molded-in handle, (4) 6" casters (2 fixed, 2 swivel, 1 with brake), slate blue

ITEM K32 -SPARE NO. <Spare No.>

ITEM K33 -REACH-IN REFRIGERATOR (1 REQ'D)
Continental Refrigerator Model 1RN Dimensions: 82.25(h) x 26(w) x 35.38(d)
Refrigerator, reach-in, one-section, 20 cu. ft., self-contained refrigeration, stainless steel front, aluminum interior & ends, standard depth, full-height solid door, cylinder lock, electronic control with digital display, hi-low alarm, electric condensate evaporator, R290 Hydrocarbon refrigerant, 1/4 HP, cETLus, NSF, ENERGY STAR®
1 eaStandard warranty: 6 year parts and labor; additional 1 year compressor part
1 ea115v/60/1-ph, 5.2 amps, cord, NEMA 5-15P
1 eaDoor hinged on right
1 ea5" Casters, standard

ITEM K34 -PREP TABLE (1 REQ'D)
Custom Model CUSTOM
S/s prep table, 8'0" x 30", with two 20" x 20" x 14" deep prep sinks with lever waste, s/s undershelf and five inch rear splash.

ITEM K34.1 - DECK MOUNT FAUCET (1 REQ'D)
Fisher Model 33130
Faucet, deck mount, 8" centers, 12" swing spout, lever handles with color coded indexes, 1/2" male inlets, brass, ADA Compliant
1 ea4 year warranty against defects in materials or workmanship

ITEM K35 -SHELVING, WALL MOUNTED (1 REQ'D)
Advance Tabco Model WS-12-48-16 Dimensions: 10.5(h) x 48(w) x 12(d)
Shelf, wall-mounted, 48"W x 12"D, 1-5/8" bullnose front edge, 1-1/2"H rear up-turn, 16/304 satin finish stainless steel, NSF

ITEM K36 -POT RACK (1 REQ'D)
Advance Tabco Model SW-48 Dimensions: 12(h) x 48(w) x 12(d)
Pot Rack, wall-mounted, double bar design, 48"W x 12"D, constructed of 1/4" x 2" stainless steel, includes: (12) plated double pot hooks, NSF

ITEM K37 -SLIM JIM TRASH CAN

By Owner

ITEM K38 -SPARE NO. <Spare No.>

ITEM K39 -SPARE NO. <Spare No.>

ITEM K40 -EXHAUST HOOD (1 REQ'D)
Captive-Aire Model 6024 AM-ND-2-PSP-F
S/S Exhaust Hood with Make-Up Air, 21' 6" long O.A., 24" high, consisting of the following components to be provided by the F.S.E.C. and installed by the Mechanical Contractor:

-Stainless Steel Captrate Solo Filter(s)
-Two hood sections
-Recessed round LED lights
-Grease cup
-Exhaust Riser
-Field wrapper (left, front and right sides, as necessary)
-Utility cabinet located on left side of hood section as shown on plans.
-Prewired electrical package factory installed in utility cabinet for Exhaust fan(s), Supply Fan(s), Audible alarm, Exhaust on in Fire Condition and Lights out in Fire Condition. LCD Interface, (INCLUDES SPARE WIRING TERMINAL(S) FOR FIELD WIRING TO BUILDING FIRE PANEL AND ELECTRIC EQUIPMENT OFF IN FIRE CONDITION)
-Pre-piped TANK Fire Suppression System
-PSP supply plenum
-Left vertical end panel
-Right vertical end panel
-3" rear standoff
- Exhaust fan(s) and curb(s)
-2 HP supply unit with inverter scroll compressor and direct drive plenum blower

NOTE: Hood permit, hanging hood, hood installation, all ductwork, setting fans and curbs, patching, all electrical field wiring, start-up & balance, gas or electric shutdown for fire hook-up shall be the responsibility of the Mechanical Contractor.

NOTE: Please refer to the Captive-Aire hood detail drawing(s) in the Food Service Equipment set of plans for further details.

ITEM K41 -FIRE PROTECTION (1 REQ'D)
Captive-Aire Model FIRE SYSTEM
Tank fire system with detection, gas valve, permit, installation, certification and one test.

ITEM K42 -WALL PANELS (1 REQ'D)
Captive-Aire Model CUSTOM
S/s wall panels from under hood to top of cove base, to extend past right end of hood to ceiling.

ITEM K43 -TILTING SKILLET BRAISING PAN, ELECTRIC (1 REQ'D)
Groen Model BPM-15EC Dimensions: 41.5(h) x 30.5(w) x 39.75(d)
Braising Pan, electric, 15-gallon capacity, 8" deep pan, 35" pan height, IPX6 water rated electronic Classic controls, manual tilt, standard etch marks, faucet bracket, round tubular open leg base, stainless steel construction, bullet feet, cUL, UL, IPX6, NSF, Made in USA
1 ea(1) year parts & labor, (10) year pan warranty
1 ea208v/60/3-ph, 7.7kW, 22.0 amps
1 eaModel Z091869 Faucet, single pantry, with swing spout

ITEM K44 -FLOOR TROUGH (1 REQ'D)
Advance Tabco Model FTG-1230 Dimensions: 4(h) x 30(w) x 12(d)
Floor Trough, 30"W x 12"D x 4" deep, 14 gauge 304 stainless steel, includes stainless steel subway grating constructed from 3/16" x 1" bars, removable stainless steel strainer basket, 4" O.D. waste pipe 3"L, pitched towards waste, NSF

ITEM K45 -CONVECTION OVEN, GAS (1 REQ'D)
Vulcan Model VC44GD Dimensions: 70(h) x 40(w) x 42.25(d)
Convection Oven, gas, double-deck, standard depth, solid state controls, electronic spark igniters, 60 minute timer, (5) nickel plated racks per oven, stainless steel front, top, sides & 8"H legs, stainless steel doors with windows, (2) 50,000 BTU, NSF, CSA Star, CSA Flame, ENERGY STAR®
1 eaGas type to be specified
1 ea(2) 120v/60/1-ph, 15.4 amps total, (2) cords with plugs
1 eaGas manifold piping included and stacking kit
1 stCasters, set of (4)

ITEM K45.1 - BLUE HOSE GAS CONNECTOR KIT (1 kt REQ'D)
Dormont Manufacturing Model 1675KITS48
Dormont Blue Hose™ Moveable Gas Connector Kit, 3/4" inside dia., 48" long, covered with stainless steel braid, coated with blue antimicrobial PVC, (1) SnapFast® QD, (1) Swivel MAX®, (1) full port valve, (1) elbow, coiled restraining cable with hardware, 167,000 BTU/hr minimum flow capacity, limited lifetime warranty

ITEM K46, K47 - RANGE, 36", 6 OPEN BURNERS (1 REQ'D)
Vulcan Model 36S-6BN-QS-PLATINUM Dimensions: 58(h) x 36(w) x 34(d)
Endurance™ Restaurant Range,gas, 36", (6) 30,000 BTU burners, lift-off burner heads, standard oven, stainless steel front, sides, backriser, & lift-off high shelf, fully MIG welded chassis, 6" legs, 215,000 BTU, CSA, NSF
1 eaGas type to be specified
1 eaModel 36RB-N Salamander Broiler, natural gas, 36" wide, 50,000 BTU

heavy duty burner, dual control, (6) grid positions, removable pan, stainless steel front, top & sides, 3/4" gas connection & pressure regulator
1 eaModel CONNECT-CHALL Inter-plumbing gas connection kit
1 eaModel RSHELF-XL36 Reinforced highshelf

ITEM K46.1 - BLUE HOSE GAS CONNECTOR KIT (1 kt REQ'D)
Dormont Manufacturing Model 16100KITS48
Dormont Blue Hose™ Moveable Gas Connector Kit, 1" inside dia., 48" long, covered with stainless steel braid, coated with blue antimicrobial PVC, (1) Snap Fast™ QD, (1) Swivel MAX®, (1) full port valve, (1) elbow, coiled restraining cable with hardware, 310,000 BTU/hr minimum flow capacity, limited lifetime warranty

ITEM K48 -CONVECTION STEAMER, COUNTERTOP (1 REQ'D)
Vulcan Model C24EA3-PLUS-QS-PLATINUM Dimensions: 19.5(h) x 24(w) x 33(d)
Convection Steamer, countertop, electric, 1 compartment, 24" wide, (3) 12" x 20" x 2-1/2" pans capacity, high output stainless steel steam generator with Timed Smart Drain & PowerFlush, staged water fill, professional controls with 60-minute timer, buzzer & constant steam feature, cook/ready lights & power switch, split water lines, stainless steel interior & exterior, leveling feet, UL EPH Classified, cULus
1 ea208v/60/3-ph, 27.0 amps, 8.5kW
1 eaModel CORDPLG3PAN3P CORD & plug set (rated to 208-240v/3-ph - 40.0 amps), CABLE 8/4 90C UL SO, SEO, SOW OR SEOW, 7'7": ANGLED PLUG HBL8462C NEMA 15-60P
1 eaModel SMF600-SYSTEM SCALEBLOCKER™ Water Treatment, field installed by others at jobsite
1 ea2nd year limited water related parts only & labor warranty
1 eaModel STAND 34YSGL Stand, 24" wide x 34" high, includes (1) set of pan slides
1 eaModel CTOPHTESHIELD Heat Shield, 3/5 pan steamer
3 eaModel HOSEWTR 3/4BBV Flex stainless steel water hose 72", 3/4" female GHT (2 per unit required for gas & electric, 3 with filter system, 1 per unit for direct steam)

ITEM K49 -CHARBROILER, GAS, COUNTERTOP (1 REQ'D)
Vulcan Model VACB25 Dimensions: 15.5(h) x 25.13(w) x 31(d)
Achiever Charbroiler, countertop, 25-1/8", (4) 17,000 BTU cast iron burners, infinite heat control valves, fully welded chassis, (1) drip tray, stainless steel front, sides & top trim, backsplash & grease trough, 4" adjustable legs, 68,000 BTU, CSA, NSF
1 eaGas type to be specified
1 eaModel SPLASH6-CB25 Splashguard, 6" add-on, sides & back

ITEM K49.1 - BLUE HOSE GAS CONNECTOR KIT (1 kt REQ'D)
Dormont Manufacturing Model 1675KITS48
Dormont Blue Hose™ Moveable Gas Connector Kit, 3/4" inside dia., 48" long, covered with stainless steel braid, coated with blue antimicrobial PVC, (1) SnapFast® QD, (1) Swivel MAX®, (1) full port valve, (1) elbow, coiled restraining cable with hardware, 167,000 BTU/hr minimum flow capacity, limited lifetime warranty

ITEM K50 -GRIDDLE, GAS, COUNTERTOP (1 REQ'D)
Vulcan Model MSA24 Dimensions: 15.25(h) x 24(w) x 31.5(d)
Heavy Duty Griddle, countertop, gas, 24" W x 24" D cooking surface, 1" thick polished steel griddle plate, embedded mechanical snap action thermostat every 12", millivolt pilot safety, manual ignition, low profile, stainless steel front, sides, front grease trough, 4" back & tapered side splashes, 4" adjustable legs, 54,000 BTU, CSA Star, CSA Flame, NSF
1 eaGas type to be specified

ITEM K50.1 - BLUE HOSE GAS CONNECTOR KIT (1 kt REQ'D)
Dormont Manufacturing Model 1675KITS48
Dormont Blue Hose™ Moveable Gas Connector Kit, 3/4" inside dia., 48" long, covered with stainless steel braid, coated with blue antimicrobial PVC, (1) SnapFast® QD, (1) Swivel MAX®, (1) full port valve, (1) elbow, coiled restraining cable with hardware, 167,000 BTU/hr minimum flow capacity, limited lifetime warranty

ITEM K51 -EQUIPMENT STAND, REFRIGERATED BASE (1 REQ'D)
Continental Refrigerator Model D48GN Dimensions: 26.38(h) x 48(w) x 34.75(d)
Refrigerator Griddle Stand, one-section, (2) drawers, accommodates (2) 12" x 20" x 6", stainless steel top with drip guard marine edge, stainless steel exterior & interior, electronic control with digital display, hi-low alarm, high/low temperature alarm, self-contained refrigeration, R290 hydrocarbon refrigerant, 1/5 HP, 10' cord, cETLus, NSF, ENERGY STAR®
1 eaStandard warranty: 7 year parts, labor, and compressor
1 ea115v/60/1-ph, 2.5 amps, cord, NEMA 5-15P
1 eaCondensing unit on the right
1 eaCasters, 3" diameter, 4"H overall
1 eaStainless steel top extension, 3"
1 earight side

ITEM K51.1 - WHEEL PLACEMENT (1 st REQ'D)
Dormont Manufacturing Model PS
(PS) Dormont Safety-Set, equipment placement system for all caster-mounted equipment, allows precise, consistent equipment placement under the fire suppression and ventilation systems, satisfies NFPA codes 17A (5.6.4) and 96 (12.1.2.3), includes two (2) units and hardware pack

ITEM K52 -GAS FLOOR FRYER (1 REQ'D)
Vulcan Model 1GR45M-QS-PLATINUM Dimensions: 47.13(h) x 15.5(w) x 30.25(d)
Fryer, gas, 15-1/2" W, free-standing, 45-50 lbs. capacity, millivolt thermostat controls, twin baskets, stainless steel cabinet & fry tank, adjustable casters (2 swivel locking & 2 non-locking), 120,000 BTU, CSA Star, CSA Flame, NSF
1 ea10 year limited tank warranty
1 eaGas type to be specified

ITEM K52.1 - BLUE HOSE GAS CONNECTOR KIT (1 kt REQ'D)
Dormont Manufacturing Model 1675KITS48PS
Dormont Blue Hose™ Moveable Gas Connector Kit, 3/4" inside dia., 48" long, covered with stainless steel braid, coated with blue antimicrobial PVC, (1) SnapFast® QD, (1) Swivel MAX®, (1) full port valve, (1) elbow, (1) pair Safety Set® with hardware mounting options, limited lifetime warranty

ITEM K53 -FRYMATE HOLDING STATION (1 REQ'D)
Vulcan Model FRYMATE VX15 Dimensions: 36.25(h) x 15.5(w) x 30.13(d)
Frymate™ Holding Station, free standing or add-on unit, 15-1/2" wide, 30-1/8" depth, stainless steel cabinet base, stainless steel top drain section with removable grease collector, set of 4 casters (2 locking), connecting strip & hardware
1 eaModel FOOD-WARMER ThermoGlo™ Food Warmer, 120v

ITEM K54 -SPARE NO. <Spare No.>

ITEM K55 -SPARE NO. <Spare No.>

ITEM K56 -REACH-IN DUAL TEMP CABINET (1 REQ'D)
Continental Refrigerator Model 1RFNHD Dimensions: 82.25(h) x 26(w) x 35.38(d)
Refrigerator/Freezer, reach-in, one-section, 10 cu ft. refrigerator/10 cu. ft. freezer, self-contained refrigeration, stainless steel front, aluminum interior & ends, standard depth, (2) half-height solid self-closing doors, cylinder locks, electronic control with digital display, freezer can be adjusted to operate as low

as -10°F, hi-low alarm, (4) epoxy-coated steel shelves, electric condensate evaporator, R290 Hydrocarbon refrigerant, dual 1/5 & 1/3 HP, cETLus, NSF
1 eaStandard warranty: 7 year parts, labor, and compressor
1 ea115v/60/1-ph, 2.5 amps, cord & plug (refrigerator)
1 ea115v/60/1-ph, 5.7 amps, cord & plug (freezer)
1 eaDoor hinged on left
1 ea5" Casters

ITEM K57 -MOBILE PLATE AND DISH DISPENSER (1 REQ'D)
Dinex Model DXPSBH2P Dimensions: 43(h) x 35.28(w) x 24.75(d)
Colossus Heated Plate Dispenser, mobile, convection, (2) self-leveling adjustable cylinders, accommodates (75) 10-1/4" dia. china plates per silo, adjustable digital thermostat, thermostatic controls maintain plates at 180°F, 75 - 90 minute heating time, (2) soft-close hinged lids, fully insulated top & sides, stainless steel dispenser mechanisms with adjustable springs, push handle, heavy duty 304 stainless steel exterior, enclosed base, corner bumpers, (4) 5" swivel plate casters (2 with brakes), dual voltage, operates at 208v/60/1-ph, 3200 watts (15 amps),, cord, NEMA 6-20P

ITEM K58 -WORK TABLE (1 REQ'D)
Fabricated Model CUSTOM
18" wide x 38"worktable with flat top, square edge, s/s undershelf and flanged feet.

ITEM K59 -HOT FOOD SERVING COUNTER / TABLE (1 REQ'D)
Dinex Model DXP5HF Dimensions: 36(h) x 74(w) x 28(d)
DineXpress™ Hot Food Unit, electric, 74"L x 36"H, (5) wells with 1000w element with thermostatically controlled each, mobile, modular design with interlocking mechanism, 14 gauge stainless steel top, 20 gauge stainless steel front & end panels, 18 gauge stainless steel bottom shelf, manifold drains standard, 5" swivel plate casters (2 with brakes), 5kW, NSF, UL
1 ea208v/60/1-ph, 24.0 amps, 5000 watts, NEMA 6-30P
1 eaModel DXPIND5 Manifold drains to master valve
1 eaModel DXPAUTOFILL Automatic water fill
1 eaModel DXPSCB5 Cutting Board for DineXpress™ system, 8", for (5) openings - 74"W, stainless

ITEM K60 -WORK TABLE (1 REQ'D)
Fabricated Model CUSTOM
24" wide x 36"work table with flat top, square edge, s/s undershelf and flanged feet.

ITEM K61 -TRAY ASSEMBLY COUNTER (1 REQ'D)
Custom Model CUSTOM

S/s tray assembly counter, flat top, 18" wide with double undershelf and flanged feet

ITEM K62 -DOUBLE OVER SHELF (1 REQ'D)
Fabricated Model CUSTOM
18" wide double over shelf, with microwave provision, mounted to items K60 and K58, with heat lamp, item K63 mounted under top shelf.

ITEM K63 -HEAT LAMP (1 REQ'D)
Hatco Model GRA-60 Dimensions: 2.5(h) x 60(w) x 6(d)
Glo-Ray® Infrared Strip Heater, 60" W, standard wattage, tubular metal heater rod, single heater rod housing, aluminum construction, 1050 watts, NSF, CE, cULus, Made in USA
1 ea120v/60/1-ph
1 eaModel BLT TOG-1 (1) Built-in toggle control
ITEM K64 -MICROWAVE OVEN (1 REQ'D)
ACP Model RCS10DSE Dimensions: 13.75(h) x 22(w) x 19(d)
Amana® Commercial Microwave Oven, 1.2 cu. ft. capacity, 1000 watts, medium volume, 10-min. dial timer, (4) power levels, non-removable air filter, side hinged door with tempered glass, accommodates 14" plate, stainless steel exterior & interior, 120v/60/1-ph, 13.0 amps, 15 MCA, 1550 watts (total), NEMA 5-15P, cETLus, ETL-Sanitation
1 ea3-year limited warranty (1 year full)

ITEM K65 -CONVEYOR TOASTER (1 REQ'D)
Vollrath Model CT2-120350 Dimensions: 13.13(h) x 14.5(w) x 16.5(d)
Conveyor Toaster, horizontal conveyor, all bread types, (350) slices per hour, 1-3/8"H opening, 10-1/2"W belt (2 slice), variable speed control, power saver mode, quartz heaters, stainless steel & aluminized steel construction, 1" adjustable legs, 120v/60/1-ph, 1.6kW, 13.3 amps, cord with NEMA 5-15P, NSF, cULus, Made in USA (model JT1) (Refer to vollrathfoodservice.com for full warranty policy)
1 ea2 years parts & 1 year labor warranty

ITEM K66 -MOBILE BASE DISPENSER (1 REQ'D)
Dinex Model DXPSBH2WB Dimensions: 43(h) x 35.28(w) x 24.75(d)
Colossus Wax Base Heater/Dispenser, mobile, convection, (2) self-leveling adjustable cylinders, accommodates (60) 9" wax bases per silo, adjustable digital thermostat, thermostatic controls maintain plates at 180°F and bases at 300°F, 75 - 90 minute heating time, (2) soft-close hinged lids, fully insulated top & sides, stainless steel dispenser mechanisms with adjustable springs, push handle, heavy duty 304 stainless steel exterior, enclosed base, corner bumpers, (4) 5" swivel plate casters (2 with brakes), dual voltage, operates at 208v/60/1-ph, 3200 watts (15 amps), or 240v/60/1-ph, 3000 watts (13.3 amps), cord, NEMA 6-20P

ITEM K67-K69 - SPARE NO. <Spare No.>

ITEM K70 -FLATWARE & TRAY CART (1 REQ'D)
Dinex Model DXPIDTS1C1418 Dimensions: 55(h) x 22.75(w) x 29.5(d)
Tray & Silverware Dispenser, open tubular frame, mobile design, 9-cylinder silverware holder, cantilever single stack 14" x 18" tray size, 150 capacity, self-elevating tray platform, stainless steel construction, (4) 5"HD non- marking swivel casters (2 with brakes) & bumpers, CSA (IDTS1C/1418)

ITEM K71 -BASE STORAGE/DRYING CART (1 REQ'D)
Dinex Model DX1173X50 Dimensions: 73(h) x 19.5(w) x 20.25(d)
TMP® Drying & Storage Cart, holds 50 domes or 100 bases/underliners or Quicktemp® bases, 1" stainless steel tubing frame, 5" casters (2 with brakes) (1173/X50)

ITEM K72 -DOME STORAGE/DRYING CART (2 REQ'D)
Dinex Model DX1173X80 Dimensions: 59(h) x 40(w) x 20.25(d)
TMP® Drying & Storage Cart, holds 80 domes or 160 bases/underliners or Quicktemp® bases, 1" stainless steel tubing frame, 5" casters (2 with brakes) (1173/X80)

ITEM K73 -AIR CURTAIN REFRIGERATOR (1 REQ'D)
Dinex Model DXPACR15L Dimensions: 77.25(h) x 26(w) x 36(d)
ACR Air Curtain Refrigerator, one-section, horizontal and vertical air flow, bottom mount self-contained refrigeration, accommodates: (15) 18" x 26" or (30) 14" x 18" trays, stainless steel tray slides, LED display, 270° swing left hinged insulated stainless steel door with reverse feature, rear mounted tubular push handle with donut bumper, non-marking corner bumpers, (4) 5" casters with brakes, stainless steel, 1/2 HP, 120v/60/1-ph, 16 amps, NEMA-5-20P, Made in USA

ITEM K74 -MEAL TRAY DELIVERY CART (8 REQ'D)
Dinex Model DXPICT12 Dimensions: 42.75(h) x 34.22(w) x 23.75(d)
TQ Economy Tray Delivery Cart, (1) door, 1-compartment, 42-3/4"H, enclosed, (12) tray capacity, designed to hold multiple tray sizes (14" x 18", 15" x 20", & Dinex room service trays), fixed tray slides with 5-1/4" spacing, two trays per slide, optional push handle, fixed panels, magnetic door catch, drop latch, (4) 5" plate-type casters, 2 swivel with brakes, 2 fixed without brakes, stainless steel construction, CSA, Made In USA (ICT/12)
8 eaModel DXPICTTR1 Top Rail, 1 sided, for TQ Economy Carts (ICT/TR1)
8 eaModel DXPICTPH Push Handle, for TQ Economy Tray Delivery Carts (ICT/PH)

8 eaModel DXPICTDRAIN Drain Assembly for TQ Economy Carts (ICT/DRAIN)

ITEM K75 -SANDWICH / SALAD PREPARATION REFRIGERATOR (1 REQ'D)
Continental Refrigerator Model SW36N10 Dimensions: 42.25(h) x 36(w) x 31.44(d)
Sandwich Unit, 36"W, 10.3 cu ft capacity, two-section, (10) 1/6 size x 4" deep pans with 12" cutting board, (2) field rehingeable doors, stainless steel top, front & end panels, aluminum back & interior, rear mounted self-contained refrigeration, automatic hot gas condensate evaporator, R290 hydrocarbon refrigerant, 1/5 hp, cETLus, NSF
1 eaStandard warranty: 7 year parts, labor, and compressor
1 ea115v/60/1-ph, 2.46 amps, cord, NEMA 5-15P
1 eaLeft Door hinged on left & right door hinged on right
1 eaCasters, 5"

ITEM K76 -WORK TABLE (1 REQ'D)
Fabricated Model CUSTOM
S/s worktable, 4'0" x 30", with s/s undershelf, 20" x 20" s/s drawer, and five inch rear splash.

ITEM K77 -BLIXER (1 REQ'D)
Robot Coupe Model BLIXER10 Dimensions: 26.75(h) x 12.44(w) x 21.5(d)
Blixer® Commercial Blender/Mixer, vertical, 11.5 liter capacity, stainless steel bowl with handle, (3) blade adjustable stainless steel Blixer® assembly, pulse switch, two speed 1800 & 3600 RPM, 11.0 amps, 4-1/2 HP, 208-240v/60/3-ph, NEMA L15-20P, cETLus, ETL-Sanitation

ITEM K78 -SHELVING, WALL MOUNTED (1 REQ'D)
Advance Tabco Model WS-12-84-16 Dimensions: 10.5(h) x 84(w) x 12(d)
Shelf, wall-mounted, 84"W x 12"D, 1-5/8" bullnose front edge, 1-1/2"H rear up-turn, 16/304 satin finish stainless steel, NSF (units 84" & longer have (3) support brackets)

ITEM K79 -MOBILE HEATED CABINET (1 REQ'D)
Cres Cor Model H137UA12D Dimensions: 73(h) x 28.75(w) x 32.75(d)
Cabinet, Mobile Heated, insulated, top-mount heater assembly, recessed push/pull handles, (12) sets of chrome plated wire universal angle slides aon 4-1/2" centers adjustable 1-1/2" centers, solid state electronic control, LED digital display, field reversible dutch doors, (4) heavy duty 5" swivel casters (2) braked, anti-microbial latches, aluminum exterior & interior, NSF, cCSAus
1 eaStandard Warranty: 1 year labor with 3 year parts warranty

1 ea120v/60/1-ph, 1.5 kW, 12.0 amp, 10 ft power cord, NEMA 5-15P
1 eaRight-hand door swing

ITEM K80 -SPARE NO. <Spare No.>

ITEM K81 -SPARE NO. <Spare No.>

ITEM K82 -ICE MAKER, CUBE-STYLE (1 REQ'D)
Hoshizaki Model KM-660MAJ Dimensions: 28(h) x 22(w) x 27.38(d)
Ice Maker, Cube-Style, 22"W, air-cooled, self-contained condenser, production capacity up to 650 lb/24 hours at 70°/50° (560 lb AHRI certified at 90°/70°), stainless steel finish, crescent cube Style, R-404A refrigerant, 115v/60/1-ph, 15.2 amps, NSF, UL
1 eaWarranty: 3-Year parts & labor on entire machine
1 eaWarranty: 5-Year parts & labor on evaporator
1 eaWarranty: 5-Year parts on compressor & air-cooled condenser
1 eaModel H9320-51 Water Filtration System, single configuration, 18.4" H
1 eaWarranty: 1-Year on entire water filtration system & replaceable elements

ITEM K83 -ICE BIN FOR ICE MACHINES (1 REQ'D)
Hoshizaki Model B-500SF Dimensions: 46(h) x 30(w) x 32.5(d)
Ice Bin, 30"W, top-hinged front-opening door, 500-lb ice storage capacity, for top-mounted ice maker, stainless steel exterior, painted legs included, protected with H-GUARD Plus Antimicrobial Agent, ETL, ETL-Sanitation
1 eaWarranty: 3-Year parts & labor

ITEM K84 -FLOOR TROUGH (1 REQ'D)
Advance Tabco Model FTG-1230 Dimensions: 4(h) x 30(w) x 12(d)
Floor Trough, 30"W x 12"D x 4" deep, 14 gauge 304 stainless steel, includes stainless steel subway grating constructed from 3/16" x 1" bars, removable stainless steel strainer basket, 4" O.D. waste pipe 3"L, pitched towards waste, NSF

ITEM K85 -BEVERAGE TABLE (1 REQ'D)
Custom Model CUSTOM BEVERAGE TABLE
S/s beverage table, 7'0" x 30", with partial s/s undershelf, five inch rear splash.

ITEM K86 -TEA BREWER

By Owner's Vendor

ITEM K87 -COFFEE BREWER

By Owner's Vendor

ITEM K88 -JUICE DISPENSER

By Owner's Vendor

ITEM K89 -ICE & WATER DISPENSER (1 REQ'D)
Hoshizaki Model DCM-271BAH-OS Dimensions: 31.75(h) x 16.63(w) x 24.25(d)
Opti-Serve Ice Maker/Water Dispenser, Cubelet-Style, air-cooled, self-contained condenser, production capacity up to 257 lb/24 hours at 70°/50° (196 lb AHRI certified at 90°/70°), 10 lb built-in storage capacity, counter model, touchless LED sensor, 10-1/4" cup clearance, protected with H-GUARD Plus Antimicrobial Agent, R-404A refrigerant, 4" legs, 115v/60/1-ph, 8.5 amps, cord & NEMA 5-15P, NSF, UL, ADA Compliant
1 eaWarranty: 3-Year parts & labor on entire machine
1 eaWarranty: 5-Year parts on compressor, air-cooled condenser
1 eaModel H9320-51 Water Filtration System, single configuration, 18.4" H (manifold & cartridge)
1 eaWarranty: 1-Year on entire water filtration system & replaceable elements

ITEM K90 -RACK DOLLY (2 REQ'D)
Cambro Model CD2020401 Dimensions: 8.25(h) x 22.5(w) x 22.5(d)
Camdolly®, 22-1/2"L x 22-1/2"W x 8-1/4"H (exterior dimensions), without handle, polyethylene construction, (4) 3" heavy duty swivel casters, load capacity 300 lbs., slate blue, NSF

ITEM K91-K93 - SPARE NO. <Spare No.>

ITEM K94 -SOILED DISHTABLE (1 REQ'D)
Fabricated Model CUSTOM
S/s soiled dish table, "U"-shaped with 7'6" x 42" deep flat drop-off area, rolled edge, 20" x 20" x 8" deep scrap sink with disposer provision, ten inch rear and right side splash, s/s legs and cross rails

ITEM K94.1 - PRE-RINSE FAUCET ASSEMBLY (1 REQ'D)
Fisher Model 21100
Pre-Rinse Assembly, single-deck dual control valve, with spring action flexible gooseneck, 21" riser, 36" hose, wall bracket & Ultra-Spray™/PLUS spray valve

(1.15 gallons per minute @ 60 PSI)

ITEM K95 -DOUBLE SIDED RACK SHELF (1 REQ'D)
Fabricated Model CUSTOM
S/s double-sided rack shelf with weep holes and vertical rack storage on top, mount to soiled dishtable.

ITEM K96 -MOBILE TRASH CANS

By Vendor

ITEM K97 -DISPOSER (1 REQ'D)
InSinkErator Model SS-200-7-AS101
SS-200™ Complete Disposer Package, sink mount system, 6-5/8" diameter inlet, with #7 collar adaptor for sink installation, 2 HP motor, stainless steel construction, includes syphon breaker, (2) solenoid valves, (2) flow control valves, removable splash baffle, stainless steel sink stopper, programmable AquaSaver® Control Center AS-101 with water-saving technology, automatic water saving function, auto reversing, timed run, post flush, adjustable leg kit
1 ea(3) years parts & labor warranty
1 ea208v/60/3-ph, 3.6 amps
1 eaModel SYPHON STD Syphon breaker standard, 1/2" (11477)

ITEM K98 -DISHWASHER, CONVEYOR TYPE LEASED BY OWNER
American Dish Service Model ADC-44 HIGH R-L Dimensions: 71.25(h) x 64(w) x 30(d)
Dishwasher, conveyor type, right to left feed, high temp/dual sanitizer, (244) racks/hour @ .49 gallon per rack, 3 HP wash pump, auto-fill, drain pump filter, top mounted controls, dual rinsing system, stainless steel motor panels, stainless steel construction, electric tank heat, 208v 60a/3ph ENERGY STAR®
1 ea208-240v/60/3-ph, 60.0 amps
1 eaModel VENT COWLS
1 eaTable limit switch

ITEM K99 -PANTLEG DUCT (1 REQ'D)
Custom Model CUSTOM
S/s all welded and watertight pantleg duct to extend 6" above ceiling, with trim rings.
See detail in food service set

ITEM K100 - DISH FAN (1 REQ'D)
Captive Aire Model DU50HFA

800 CFM dish fan and roof curb

ITEM K101 - BOOSTER HEATER, ELECTRIC LEASED, BY OWNER
Hubbell Water Heaters Model J1627 Dimensions: 31.38(h) x 23.5(w) x 23(d)
Booster Heater, electric, 27.0 kW, 16-gallon storage capacity
1 eaModel J1627R 208v/60/3-ph, 75.0 amps

ITEM K102 - CLEAN DISH TABLE (1 REQ'D)
Custom Model CUSTOM
S/s clean dish table. "L" shaped, with removable s/s rollers in s/s roller pan with drain, s/s legs and cross rails, ten inch rear splash.

ITEM K103 - DISHTABLE SORTING SHELF (1 REQ'D)
Advance Tabco Model DT-6R-13 Dimensions: 15.38(h) x 62(w) x 15.5(d)
Sorting Shelf, wall mounted, traditional design, 62"W, accommodates (3) full size dish racks, solid end brackets, stainless steel, NSF

ITEM K104 - RACK DOLLY (2 REQ'D)
Cambro Model CD2020401 Dimensions: 8.25(h) x 22.5(w) x 22.5(d)
Camdolly®, 22-1/2"L x 22-1/2"W x 8-1/4"H (exterior dimensions), without handle, polyethylene construction, (4) 3" heavy duty swivel casters, load capacity 300 lbs., slate blue, NSF

ITEM K105 - HAND SINK (1 REQ'D)
Advance Tabco Model 7-PS-50 Dimensions: 13(h) x 17.25(w) x 15.25(d)
Hand Sink, wall mounted, 14" wide x 10" front-to-back x 5" deep bowl, 20 gauge 304 stainless steel, with heavy duty splash mounted gooseneck faucet, lever drain with overflow, P-trap, wall bracket, NSF, cCSAus
1 eaModel K-316-LU Wrist Handles

ITEM K106 - EYE WASH STATION (1 REQ'D)
T&S Brass Model EW-7360B-TMV
Eyewash System, wall mount, thermostatic mixing valve, chrome-plated brass ball valve, 1/2" NPT, 1-1/4" outlet

ITEM K107 - DRYING RACK UNIT (1 REQ'D)
Metro Model MAX4-PR48VX3 Dimensions: 68(h) x 48(w) x 24(d)
MetroMax® 4 Mobile Drying Rack Unit, 48"W x 24"D x 68"H, 4-tier, for bulk drying & trays/cutting boards/sheet pans, includes: (3) open shelf frames, (1) shelf, (4) 63" mobile posts, (2) drop-ins, (1) cutting board/tray drying rack, (4)

polymer swivel casters (2 with brakes), built in Microban® antimicrobial product protection, NSF

ITEM K108 - CLEAN DISH/PAN SHELVING (1 lt REQ'D)
Metro Model EPOXY
One lot clean dish/pan shelving, 74" high, four tier, size and configure per plan layout

ITEM K109 - CART, UTILITY (1 REQ'D)
Cambro Model SC225131 Dimensions: 34(h) x 31.25(w) x 18(d)
Service Cart Pro, 31-1/4"L x 18"W x 34"H, small, (3) ribbed shelves, open sides, 390 lbs. total weight capacity (130 lbs. per shelf), (2) 3" rigid and (2) 3" swivel casters with brake, one piece molded body, polyethylene, dark brown, NSF
ITEM K110 - SPARE NO. <Spare No.>

ITEM K111 - SPARE NO. <Spare No.>

ITEM K112 - MOP SINK (1 REQ'D)
Advance Tabco Model 9-OP-20 Dimensions: 10(h) x 25(w) x 21(d)
Mop Sink, floor mounted, 25"W x 21"D x 10"H (overall), 20"W x 16" front-to-back x 6" deep (bowl size), free flow drain with 2" IPS outlet, stainless steel construction, NSF
1 eaModel K-240 Service Sink Faucet, wall mount, heavy duty, 8" OC, 6-1/2" spout, with hose thread & pail hook, vacuum breaker spout, wall braced, chrome-plated brass
1 eaModel K-06 Splash Mount Faucet Mounting Kit

ITEM K113 - WIRE SHELVING (5 REQ'D)
Metro Model 1836NK3 Dimensions: 36(w) x 18(d)
Super Erecta® Shelf, wire, 36"W x 18"D, Metroseal™ Green epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection, plastic split sleeves are included in each carton, NSF
4 eaModel 74PK3 Super Erecta® SiteSelect™ Post, 74-1/2"H, adjustable leveling bolt, posts are grooved at 1" increments & numbered at 2" increments, double grooved every 8", Metroseal 3 Green epoxy coated corrosion-resistant finish with Microban® antimicrobial protection

LAUNDRY

ITEM E01 - EMERGENCY STORAGE SHELVING (1 lt REQ'D)
Metro Model EPOXY
One lot emergency storage shelving, 74" high, four tier, size and configure per plan layout.

ITEM E02 - COMMERCIAL WASHER (2 REQ'D)
Electrolux Professional Model EED-665
65 pound, hard mount commercial washer

ITEM E03 - COMMERCIAL WASHER FUTURE
65 pound, hard mount commercial washer

ITEM E04 - DRAIN, FLOOR TROUGH (1 REQ'D)
H-M Company Model CUSTOM
12" high x 18" wide x 15' long
With lint filter
In ground installation

Drain washers into top
Trough drain is 4" DW
ITEM E05 - HAND SINK (1 REQ'D)
Advance Tabco Model 7-PS-90 Dimensions: 42(h) x 17.25(w) x 15.25(d)
Hand Sink, pedestal mounted base, 14" wide x 10" front-to-back x 5" deep bowl, 20 gauge 304 stainless steel, heavy duty splash mounted faucet, pedal valves with easy access design, basket drain, wall bracket, NSF, cCSAus
1 eaModel K-316-LU Wrist Handles

ITEM E06 - SOILED LAUNDRY CARTS (5 REQ'D)
R&B Wire Model 416SOB
16 bu, antimicrobial soiled laundry cart

ITEM E07 - TWO-COMPARTMENT SINK (1 REQ'D)
BY GC Model SINKS
By Plumbing Contractor

ITEM E08 - SPARE NO. <Spare No.>

ITEM E09 - COMMERCIAL DRYER (2 REQ'D)

Electrolux Professional Model DE-683
83 pound gas dryers

ITEM E10 - COMMERCIAL DRYER FUTURE
83 pound gas dryer

ITEM E11 - COUNTER W/ SINK (1 REQ'D)
BY GC Model MILLWORK
Counters with storage

ITEM E12 - MOBILE FOLDING TABLE (1 REQ'D)
Custom Model CUSTOM
S/s mobile table with s/s undershelf

ITEM E13 - CLEAN LAUNDRY SHELVING

By GC

BISTRO

ITEM B01 - PASS-THRU REFRIGERATOR (1 REQ'D)
Continental Refrigerator Model D1RNPT Dimensions: 83.25(h) x 26(w) x 38.75(d)
Designer Line Refrigerator, pass-thru, one-section, self-contained refrigeration, aluminum exterior & interior, stainless steel front, standard depth cabinet, full-height solid doors, cylinder locks, electronic control with digital display, hi-low alarm, 6" stainless steel legs, R290 hydrocarbon refrigerant, 1/4 HP, ENERGY STAR®
1 eaStandard warranty: 7 year parts, labor, and compressor
1 ea115v/60/1-ph, 5.2 amps, cord, NEMA 5-15P
1 eaDoor hinged on right, standard (control side)
1 eaDoor hinged on left (rear)
1 stModel 50205-4 Casters, swivel, with brakes (4" diameter rubber tires) set of 4 (5" height)

ITEM B02 - BEVERAGE TABLE (1 REQ'D)
Custom Model CUSTOM BEVERAGE TABLE
S/s beverage table with partial s/s undershelf, flat bar behind item B07 undercounter refrigerator so the unit slides under table, item B03 handsink built in, five inch rear splash.

ITEM B03 - BUILT-IN HANDSINK (1 REQ'D)
Custom Model CUSTOM
Five inch deep hand sink built into beverage counter

ITEM B03.1 - DECK MOUNT FAUCET (1 REQ'D)
Fisher Model 35150
Faucet, deck mount, 4" centers, 12" swivel gooseneck spout, lever handles with color coded indexes, 1/2" NPT male inlets, brass, ADA Compliant
1 ea4 year warranty against defects in materials or workmanship, standard

ITEM B04 - SLIM JIM TRASH CAN

By Owner

ITEM B05 - COFFEE BREWER

By Owner's Vendor

ITEM B06 - TEA BREWER

By Owner's Vendor

ITEM B07 - UNDERCOUNTER REFRIGERATOR (1 REQ'D)
Continental Refrigerator Model SW27N-U Dimensions: 31.81(h) x 27.5(w) x 31.56(d)
Undercounter Refrigerator, 27"W, 7.4 cu ft capacity, one-section, (1) field rehingeable door, stainless steel front, top & end panels, aluminum interior, 1-3/8" diameter plate casters, front breathing, rear-mounted self-contained refrigeration, R290 Hydrocarbon refrigerant, 1/5 hp, cETLus, NSF, ENERGY STAR®
1 eaStandard warranty: 7 year parts, labor, and compressor
1 ea115v/60/1-ph, 2.46 amps, cord, NEMA 5-15P
1 eaDoor hinged on left

ITEM B08 - ESPRESSO CAPPUCCINO MACHINE (1 REQ'D)
Nuova Simonelli Model APPIA LIFE COMPACT VOL 110V Dimensions: 20(h) x 22(w) x 21(d)
MAPPC19VOL02ND0002 Appia Life Espresso Machine, automatic, with volumetric dosing, 2 group compact, 7.5 liter boiler, 2 steam wands (Cool Touch), hot water nozzle, Black, 1.5kW, 110-125v/60/1-ph, 13 amps, NEMA 5-15P, UL, CSA, NSF

1 ea2 year parts warranty on espresso equipment

ITEM B09 - SYRUP RACK

By owner

ITEM B10 - REFRIGERATED MERCHANDISER (1 REQ'D)
True Mfg. - General Foodservice Model GDM-23-HC~TSL01 Dimensions: 78.63(h) x 27(w) x 29.88(d)
Refrigerated Merchandiser, one-section, True standard look version 01, (4) shelves, (1) Low-E thermal glass hinged door, LED interior lights, powder coated steel exterior, white aluminum interior with stainless steel floor, R290 Hydrocarbon refrigerant, 1/3 HP, 115v/60/1-ph, 5.4 amps, NEMA 5-15P, cULus, UL EPH Classified, CE, Made in USA, ENERGY STAR®
1 ea7 year compressor warranty, 7 years parts warranty, 7 year labor warranty
1 eaExterior: Black powder coated steel
1 eaInterior: White aluminum, with white shelving
1 eaDoor hinged right
1 eaIlluminated sign decal: S-TS-02 "TRUE Stripe" graphic
1 stCastors, 2-1/2"

ITEM B11 - SPARE NO. <Spare No.>

ITEM B12 - SPARE NO. <Spare No.>

ITEM B13 - ISLAND COUNTER

Millwork, By GC

ITEM B14 - DROP-IN SINK (1 REQ'D)
Advance Tabco Model DI-1-1515 Dimensions: 6(h) x 15(w) x 15(d)
Special Value Drop-In Sink, 1-compartment, 15"W x 15"D x 6" deep (overall), 12-1/4" wide x 10-1/4" front-to-back x 6" deep bowl, no drip self-rimmed edge, 20/304 stainless steel, with 4" on-center deck mounted gooseneck faucet, 3-1/2" basket drain with strainer, NSF
1 eaModel K-316-LU Wrist Handles

ITEM B15 - DROP-IN ICE BIN (1 REQ'D)
Advance Tabco Model D-24-IBL Dimensions: 14(h) x 21(w) x 18(d)
Ice Bin, drop-in, 50-lb ice capacity, 21”W x 18”D x 14" deep overall (bin size 18"W x 13-5/8"D x 11" deep), removable stainless steel sliding cover, insulated, 1" diameter drain, NSF (cutout size 15-1/4" x 20-3/8")

ITEM B16 - BLENDER, BAR (2 REQ'D)
Vitamix Model 062824 Dimensions: 17.76(h) x 8(w) x 9(d)
Drink Machine Advance®, stackable 48 oz. (1.4 liter) clear BPA Free Tritan™ Advance® container, includes (6) pre-loaded programs, includes: Advance® blade assembly & lid, black base, 2.3 peak HP, 120v/50/60/1-ph, 11.5 amps, NEMA 5-15P, cULus, NSF
2 ea3 years warranty on motor base parts & 1 year warranty on labor
2 eaModel 015578 Sound Reducing Centering Pad

ITEM B17 - REACH-IN UNDERCOUNTER FREEZER (1 REQ'D)
Continental Refrigerator Model SWF27N-U Dimensions: 31.81(h) x 27.5(w) x 31.56(d)
Undercounter Freezer, 27"W, 7.4 cu ft capacity, one-section, (1) field rehingeable door, stainless steel front, top & end panels, aluminum interior, 1-3/8" diameter plate casters, front breathing, rear-mounted self-contained refrigeration, R290 Hydrocarbon refrigerant, 1/4 HP, cETLus, NSF
1 eaStandard warranty: 7 year parts, labor, and compressor
1 ea115v/60/1-ph, 4.8 amps, cord, NEMA 5-15P
1 eaDoor hinged on left

ITEM B18 - SPARE NO. <Spare No.>

ITEM B19 - SPARE NO. <Spare No.>

ITEM B20 - DISPLAY CASE, REFRIGERATED, SELF-SERVE (1 REQ'D)
Federal Industries Model LPRSS3 Dimensions: 46(h) x 36(w) x 34(d)
Specialty Display Low Profile Self-Serve Refrigerated Merchandiser, 36"W x 34"D x 46”H, self contained refrigeration with condensate evaporator, electronic temperature control, night curtain, 3500K LED lighting top & below shelf, (2) tiers of adjustable solid black metal shelves, stainless steel display deck & black interior, black trim, tempered glass ends, choice of laminate, thermometer, steel base construction, adjustable feet, R290 , cULus, UL EPH Classified, Made In USA, DOE 2017 compliant
1 ea120v/60/1-ph, 1/3 hp, 16.0 amps, cord & plug (NEMA 5-20P)
1 eaFive year compressor warranty
1 eaLaminate standard color - Black
ITEM B21 - POS COUNTER

Millwork, By GC

ITEM B22 - POS

By owner

ITEM B23 - SLIM JIM TRASH CAN

BY Owner

ITEM B24 - DISPLAY CASE, DIPPING ICE CREAM (1 REQ'D)
Master-Bilt Products Model DD-26LCG Dimensions: 50(h) x 27.25(w) x 27.5(d)
Ice Cream Dipping/Display Cabinet, low-glass, (4) 3 gallon can display, painted galvanized steel interior and exterior, 50" high stainless steel serving deck, curved glass view windows, LED interior lighting with switch, temperature range 5° to -5°F, 3/5 HP, 115v/60/1-ph, 5.9 amps, NEMA 5-15P, cULus, UL EPH Classified
1 ea2 year parts and labor warranty on cabinet
1 ea5 year compressor part warranty
1 eaWhite interior and exterior finish
1 eaModel A394-11150 Frost Shield, for DD-26L/DD-26LCG
1 eaModel A394-20301 Can Holders, includes white can covers, fits DD-26/DD-26L/DD-26LCG
4 eaModel 44-00984 Can Covers, clear (each) for DD series
1 eaModel A390-11129 Lid Locking Kit

ITEM B25 - DIPPER WELL (1 REQ'D)
Fisher Model 3041
Dipper Well Faucet and Sink, 6-7/8" diameter, 1-1/2" x 4" tailpiece, 40° - 140°F system limits, 200 psi maximum static pressure limit, stainless steel seat faucet, stainless steel pan with removable inner shell

SNACK BARS

ITEM SB01 - REACH-IN REFRIGERATOR (2 REQ'D)
Continental Refrigerator Model 1RN Dimensions: 82.25(h) x 26(w) x 35.38(d)
Refrigerator, reach-in, one-section, 20 cu. ft., self-contained refrigeration, stainless steel front, aluminum interior & ends, standard depth, full-height solid door, cylinder lock, electronic control with digital display, hi-low alarm, electric condensate evaporator, R290 Hydrocarbon refrigerant, 1/4 HP, cETLus, NSF, ENERGY STAR®
2 eaStandard warranty: 7 year parts, labor, and compressor
2 ea115v/60/1-ph, 5.2 amps, cord, NEMA 5-15P
2 eaDoor hinged on right, one hinged left
2 ea5" Casters

ITEM SB02 - BACK COUNTERS

Qty: 2
Millwork, by GC

ITEM SB03 - COFFEE BREWER

Qty: 2
By Owner's Vendor

ITEM SB04 - HANDSINK/UTILITY SINK

Qty: 2
By GC

ITEM SB05 - JUICE DISPENSER

Qty: 2
By Owner's Vendor

ITEM SB06 - ICE & WATER DISPENSER (2 REQ'D)
Hoshizaki Model DCM-271BAH-OS Dimensions: 31.75(h) x 16.63(w) x 24.25(d)
Opti-Serve Ice Maker/Water Dispenser, Cubelet-Style, air-cooled, self-contained condenser, production capacity up to 257 lb/24 hours at 70°/50° (196 lb AHRI certified at 90°/70°), 10 lb built-in storage capacity, counter model, touchless LED sensor, 10-1/4" cup clearance, protected with H-GUARD Plus Antimicrobial Agent, R-404A refrigerant, 4" legs, 115v/60/1-ph, 8.5 amps, cord & NEMA 5-15P, NSF, UL, ADA Compliant
2 eaWarranty: 3-Year parts & labor on entire machine
2 eaWarranty: 5-Year parts on compressor, air-cooled condenser
2 eaModel H9320-51 Water Filtration System, single configuration, 18.4" H (manifold & cartridge)

ITEM SB07 - MICROWAVE OVEN (2 REQ'D)
ACP Model RCS10DSE Dimensions: 13.75(h) x 22(w) x 19(d)
Amana® Commercial Microwave Oven, 1.2 cu. ft. capacity, 1000 watts, medium volume, 10-min. dial timer, (4) power levels, non-removable air filter, side hinged door with tempered glass, accommodates 14" plate, stainless steel exterior & interior, 120v/60/1-ph, 13.0 amps, 15 MCA, 1550 watts (total), NEMA 5-15P, cETLus, ETL-Sanitation
2 ea3-year limited warranty (1 year full)

ITEM SB08 - SLIM JIM TRASH CANS

By Owner

MEMORY CARE

ITEM MC01 - MOP SINK (1 REQ'D)
Advance Tabco Model 9-OP-20-EC-X Dimensions: 10(h) x 25(w) x 21(d)
Special Value Mop Sink, floor mounted, 25"W x 21"D x 10"H (overall), 20"W x 16" front-to-back x 6" deep (bowl size), free flow drain with 2" IPS outlet, stainless steel construction
1 eaModel K-240-X Service Sink Faucet, wall mount, heavy duty, 8" OC, 6-1/2" spout, with hose thread & pail hook, vacuum breaker spout, wall braced, chrome-plated brass
1 eaModel K-242 Mop Hanger, 23", accommodates (3)

ITEM MC02 - SHELVING, WALL MOUNTED (1 REQ'D)
Advance Tabco Model WS-12-24-16 Dimensions: 10.5(h) x 24(w) x 12(d)
Shelf, wall-mounted, 24"W x 12"D, 1-5/8" bullnose front edge, 1-1/2"H rear up-turn, 16/304 satin finish stainless steel, NSF

ITEM MC03 - HAND SINK (1 REQ'D)
Advance Tabco Model 7-PS-50 Dimensions: 13(h) x 17.25(w) x 15.25(d)
Hand Sink, wall mounted, 14" wide x 10" front-to-back x 5" deep bowl, 20 gauge 304 stainless steel, with heavy duty splash mounted gooseneck faucet, lever drain with overflow, P-trap, wall bracket, NSF, cCSAus
1 eaModel K-316-LU Wrist Handles

ITEM MC04 - REACH-IN REFRIGERATOR (1 REQ'D)
Continental Refrigerator Model 1RN Dimensions: 82.25(h) x 26(w) x 35.38(d)
Refrigerator, reach-in, one-section, 20 cu. ft., self-contained refrigeration, stainless steel front, aluminum interior & ends, standard depth, full-height solid door, cylinder lock, electronic control with digital display, hi-low alarm, electric condensate evaporator, R290 Hydrocarbon refrigerant, 1/4 HP, cETLus, NSF, ENERGY STAR®
1 eaStandard warranty: 7 year parts, labor, and compressor
1 ea115v/60/1-ph, 5.2 amps, cord, NEMA 5-15P
1 eaDoor hinged on left
1 ea5" Casters

ITEM MC05 - BEVERAGE TABLE (1 REQ'D)
Fabricated Model CUSTOM BEVERAGE TABLE
S/s beverage table, 7/0" x 30", with partial s/s undershelf, five inch rear and right

side splash.

ITEM MC06 - ICE & WATER DISPENSER (1 REQ'D)
Hoshizaki Model DCM-271BAH-OS Dimensions: 31.75(h) x 16.63(w) x 24.25(d)
Opti-Serve Ice Maker/Water Dispenser, Cubelet-Style, air-cooled, self-contained condenser, production capacity up to 257 lb/24 hours at 70°/50° (196 lb AHRI certified at 90°/70°), 10 lb built-in storage capacity, counter model, touchless LED sensor, 10-1/4" cup clearance, protected with H-GUARD Plus Antimicrobial Agent, R-404A refrigerant, 4" legs, 115v/60/1-ph, 8.5 amps, cord & NEMA 5-15P, NSF, UL, ADA Compliant
1 eaWarranty: 3-Year parts & labor on entire machine
1 eaWarranty: 5-Year parts on compressor, air-cooled condenser
1 eaModel H9320-51 Water Filtration System, single configuration, 18.4" H
1 eaWarranty: 1-Year on entire water filtration system & replaceable elements

ITEM MC07 - JUICE DISPENSER

By Owner's vendor

ITEM MC08 - COFFEE BREWER

By Owner's vendor

ITEM MC09 - TEA BREWER

By Owner's vendor

ITEM MC10 - RACK DOLLY (1 REQ'D)
Cambro Model CD2020401 Dimensions: 8.25(h) x 22.5(w) x 22.5(d)
Camdolly®, 22-1/2"L x 22-1/2"W x 8-1/4"H (exterior dimensions), without handle, polyethylene construction, (4) 3" heavy duty swivel casters, load capacity 300 lbs., slate blue, NSF

ITEM MC11 - SHELVING, WALL MOUNTED (1 REQ'D)
Advance Tabco Model WS-12-60-16 Dimensions: 10.5(h) x 60(w) x 12(d)
Shelf, wall-mounted, 60"W x 12"D, 1-5/8" bullnose front edge, 1-1/2"H rear up-turn, 16/304 satin finish stainless steel, NSF

ITEM MC12 - SPARE NO. <Spare No.>

ITEM MC13 - SPARE NO. <Spare No.>

ITEM MC14 - HOT FOOD WELL TABLE, ELECTRIC (1 REQ'D)
Randell Model 3613 Dimensions: 36(h) x 48(w) x 30(d)

Hot Food Table, electric, 48" L, 30" D, 36" H, individual die-stamped (3) 12" x 20" top openings, sealed well with bottom element (used for wet operation), individual thermostatically controlled, stationary modular, open shelf base, stainless steel top & ends, full length 8" D NSF workboard & stainless steel 7" D plate shelf
1 ea208v/60/1-ph, 2.6 kw, 12.48 amps, NEMA 6-20P, standard (3 x 865 watt elements)
1 eaModel HFFCTSGLL Fill Faucet Left
1 ea6" Legs
1 eaModel HFDST48 Overshelf, deck mount, single tier 48"

ITEM MC15 - WORK TABLE (1 REQ'D)
Fabricated Model CUSTOM
S/s work table, 3'0" x 30", with s/s undershelf and five inch rear splash.

ITEM MC16 - MICROWAVE OVEN (1 REQ'D)
ACP Model RCS10DSE Dimensions: 13.75(h) x 22(w) x 19(d)
Amana® Commercial Microwave Oven, 1.2 cu. ft. capacity, 1000 watts, medium volume, 10-min. dial timer, (4) power levels, non-removable air filter, side hinged door with tempered glass, accommodates 14" plate, stainless steel exterior & interior, 120v/60/1-ph, 13.0 amps, 15 MCA, 1550 watts (total), NEMA 5-15P, cETLus, ETL-Sanitation
1 ea3-year limited warranty (1 year full)
1 eaAdvance Tabco Model MS-24-24 Microwave Shelf, wall-mounted, 24"W x 24"D, stainless steel, NSF

ITEM MC17 - SLIM JIM TRASH CAN

By owner

ITEM MC18 - SPARE NO. <Spare No.>

ITEM MC19 - SPARE NO. <Spare No.>

ITEM MC20 - ICE CREAM DIPPING CABINET (1 REQ'D)
Atlas Metal Model WDF-2 Dimensions: 26.75(h) x 29.75(w) x 24(d)
Ice Cream Freezer, drop-in type, with self-contained refrigeration, 4-1/2 cu.ft/100 lbs. capacity, stainless steel top & inner liner, galvanized outer liner, with hinged lids, on/off thermostat switch & pilot light
1 ea5-year compressor warranty
1 ea120v/60/1-ph, 1/4 HP, 6.2 amps, NEMA 5-15P
1 eaModel LLD Lid Locking Device
1 eaModel #2060-1 Condensate Evaporator
1 eaModel RS Remote On/Off Switch, for counter mounting

ITEM MC21 - DIPPER WELL (1 REQ'D)
Fisher Model 3041
Dipper Well Faucet and Sink, 6-7/8" diameter, 1-1/2" x 4" tailpiece, 40° - 140°F system limits, 200 psi maximum static pressure limit, stainless steel seat faucet, stainless steel pan with removable inner shell

ITEM MC22 - HANDSINK/UTILITY SINK

By GC

ITEM MC23 - CART, UTILITY/BUSSING (1 REQ'D)
Cambro Model SC330110 Dimensions: 37.25(h) x 37.5(w) x 22(d)
Service Cart Pro, 37-1/2"L x 22"W x 37-1/4"H, medium, (3) ribbed shelves, one closed side, 600 lbs. total weight capacity (200 lbs. per shelf), (2) 6" rigid and (2) 6" swivel casters with brake, one piece molded body, polyethylene, black, NSF

SECTION 122114

WINDOW BLINDS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Provide 2" vinyl, inside mount, horizontal blinds with standard control, at all windows located in the Patient Rooms, as well as at all exterior windows located in back-of-the-house rooms and other rooms used exclusively by staff.

B. All blinds located at windows in Public and Amenity (common) areas will be furnished and installed under the Owner’s FF&E budget.

C. All blind colors shall be selected by the Interior Designer from the manufacturer's standard color line.

D. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 6 Section "Miscellaneous Carpentry" for wood blocking and grounds for mounting horizontal louver blinds.

1.03 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data for each type of blind specified. Include printed data on physical characteristics.

C. Shop drawings showing location and extent of blinds. Show installation details at and relationship to adjoining work. Include elevations indicating blind units. Indicate location of blind controls.

D. Samples for initial selection in the form of manufacturer's color charts showing the full range

of colors, textures, and patterns available for each type of blind indicated.

E. Samples for verification of the following products, in manufacturer's standard sizes, showing the full range of color, texture, and pattern variations expected. Prepare samples from the same material to be used for the Work.

F. Schedule of blinds using same room designations indicated on Drawing.

G. Maintenance data for blinds to include in the operation and maintenance manual specified in Division 1. Include the following:
   1. Methods for maintaining blinds and finishes.
   2. Precautions for cleaning materials and methods that could be detrimental to finishes and performance.

1.04 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide horizontal louver blinds identical to those tested for the following fire-test-response characteristics as determined by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

   1. Test Method: NFPA 701.
   2. Rating: Pass.

B. Single-Source Responsibility: Obtain each type of blind from one source and by a single manufacturer.

1.05 PROJECT CONDITIONS

A. Field Measurements: Check actual blind dimensions by accurate field measurements before fabrication, and show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Space Enclosure and Environmental Limitations: Do not install blinds until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient temperature and humidity conditions are and will be continuously maintained at values near those indicated for final occupancy.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Louver Blinds:
   a. Hunter Douglas, Inc.
   b. Levolor Corp.
   c. Bali Blinds

B. Available Products: Subject to compliance with requirements, louver blinds that may be incorporated in the Work include, but are not limited to, the products selected by the Interior Designer.

C. Products: Subject to compliance with requirements, provide one of the products specified in each Product Data sheet at the end of this Section.

2.02 FABRICATION

A. Product Standard and Description: Comply with AWCMA Document 1029 for each blind unit consisting of louvers, rails, cord locks, tilting mechanisms, tapes, and installation hardware.

B. Lifting and Tilting Mechanisms: Non-corrosive, self-lubricating materials.

C. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):
   1. Blind Units Installed Between (Inside) Jambs: Width equal to 1/4 inch (6 mm) per side or 1/2 inch (12 mm) total, plus or minus 1/8 inch (3 mm), less than jamb to jamb dimension of opening in which each blind is installed. Length equal to 1/4 inch (6 mm), plus or minus 1/8 inch (3 mm), less than head to sill dimension of opening in which each blind is installed.

D. Installation Fasteners: Not less than 2 fasteners per bracket, fabricated from metal non-corrosive to blind hardware and adjoining construction; support blind units under conditions of normal use.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the blinds. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install blinds level, plumb, and located so exterior louver edges in any position are not closer than 1 inch (25 mm) to interior face of glass lites.

1. Jamb Mounted: Install head rail flush with face of opening jamb and head.

3.03 ADJUSTING

A. Adjust components and accessories for proper operation.

3.04 CLEANING

A. Clean blind surfaces, according to manufacturer's instructions, after installation.

B. Remove surplus materials, packaging, rubbish, and debris resulting from installation. Leave installation areas neat, clean, and ready for use.

3.05 PROTECTION

A. 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 the time of Substantial Completion.

END OF SECTION

SECTION 123623

PLASTIC LAMINATE CLAD COUNTERTOPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS: drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections.

1.2 SUMMARY: section includes plastic laminate clad countertops.

1.3 ACTION SUBMITTALS

A. Product Data: each type of product. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification treated materials comply with requirements.

B. Shop Drawings: plastic-laminate-clad countertops.

1. Include plans, sections, details, and attachments to other work. Detail fabrication and installation, including field joints.
2. Show locations/sizes of cutouts and holes for installed items in plastic laminate clad countertops.
3. Apply AWI Quality Certification Program label to Shop Drawings.

C. Verification Samples:

1. Plastic Laminates: each type, color, pattern, and surface finish required, 8” x 10” in size.
2. Wood-Grain Plastic Laminates: each type, color, pattern, and surface finish required, 12” x 24” in size.
3. Fabrication Sample: each type/profile of countertop required, provide one sample applied to core material with specified edge material applied to one edge.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: Installer and fabricator.

B. Product Certificates: 1) composite wood and agrifiber products, 2) high-pressure decorative laminate, 3) chemical-resistant, high-pressure decorative laminate, and 4) adhesives.

C. Quality Standard Compliance Certificates: AWI Quality Certification Program.

D. Evaluation Reports: fire-retardant-treated materials, from ICC-ES.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: shop employing skilled workers who custom fabricate products similar to those required for this Project whose products have a record of successful in-service performance. Shop Certification: AWI Quality Certification Program accredited participant.

B. Installer Qualifications: fabricator of products, AWI Quality Certification Program accredited participant.

1.6 DELIVERY, STORAGE, & HANDLING: deliver countertops only after casework and supports on which they will be installed have been completed in installation areas. Store countertops in areas where environmental conditions comply with requirements specified in "Field Conditions" Article. Keep countertop surfaces covered with protective covering during handling and installation.

1.7 FIELD CONDITIONS

A. Environmental Limitations: do not deliver/install countertops until building is enclosed, wet-work is complete, and HVAC system is operating/maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

B. Field Measurements: where countertops are indicated to fit to other construction, verify (before fabrication) other construction’s dimensions by field measurements indicating measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 FABRICATORS: subject to compliance with requirements, provide products by fabricators offering products that may be incorporated into the Work include, but are not limited to:

2.2 PLASTIC-LAMINATE-CLAD COUNTERTOPS

A. Quality Standard: unless otherwise noted, comply with "Architectural Woodwork Standards" for grades of plastic-laminate-clad countertops indicated for construction, finishes, installation, and other requirements. Provide inspections of fabrication and installation together with labels and certificates from AWI certification program indicating the countertops comply with requirements of grades specified.
   1. Contract Documents contain requirements that are more stringent than the referenced quality standard. Comply with Contract Document requirements in addition to those of the referenced quality standard.

B. Grade: economy.

C. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGS.

D. Chemical-Resistant, High-Pressure Decorative Laminate: NEMA LD 3, Grade HGP, and as follows:
   1. Laminate has the following ratings when tested with indicated reagents per NEMA LD 3, Test Procedure 3.9.5:

      a. Nitric acid (30%), sulfuric acid (77%), and hydrochloric acid (37%): moderate effect.
      b. Phosphoric acid (75%), acetic acid (98%), and phenol (85%), sodium hydroxide (25%), sodium sulfide (15%) and ammonium hydroxide (28%): no effect.
      c. Formaldehyde, ethyl acetate, ethyl ether, benzene, xylene, furfural, butyl alcohol, zinc chloride, gentian violet, methyl red, and methyl ethyl ketone: no effect.

E. Colors, Patterns, and Finishes: provide materials and products resulting in colors/textures of exposed laminate surfaces complying with:

   1. Manufacturer designations matching Architect’s sample.
   2. As selected by Architect from manufacturer's full range in the following categories:

      a. Solid colors and patterns, matte finish.
      b. Solid colors with core same color as surface, matte finish.
      c. Wood grains, matte finish with grain running parallel to length of countertop.

F. Edge Treatment: as indicated on Drawings].

G. Core Material: as selected by fabricator to comply with quality standard].

H. Core Material at Sinks: particleboard made with exterior glue or exterior-grade plywood.

I. Core Thickness: ¾”, build up countertop thickness to 1½” at front, back, and ends with additional layers of core material laminated to top.

J. Backer Sheet: provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.

K. Paper Backing: provide paper backing on underside of countertop substrate.

2.3 WOOD MATERIALS

A. Wood Products: provide materials comply with requirements of referenced quality standard unless otherwise indicated. Wood moisture content: 5% to 10%.

B. Composite Wood and Agrifiber Products: provide materials complying with requirements of referenced quality standard for each type of countertop and quality grade specified unless otherwise noted. Particleboard: ANSI A208.1, Grade M-2.

2.4 FIRE-RETARDANT-TREATED MATERIALS

A. Where fire-retardant-treated materials are indicated, use materials acceptable to authorities having jurisdiction and with specified fire-test-response characteristics as determined by testing identical products per to test method indicated by a qualified testing agency.

1. Use treated materials complying with referenced quality standard requirements. Do not use warped, discolored, or otherwise defective materials.
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 qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.

B. Products with a flame-spread index of 25 or less as tested per ASTM E84, with no evidence of significant progressive combustion when test is extended an additional 20 minutes, and the flame front not extending more than 10½' beyond burner centerline at any time during the test.

1. Kiln dry lumber and plywood after treatment to maximum moisture content of 19% and 15%, respectively.
2. For items indicated to receive a stained/natural transparent finish, use organic resin chemical formulation.
3. Mill lumber after treatment within limits set for wood removal not affecting listed fire-test-response characteristics, using woodworking shop certified by testing/inspecting agency.
4. Mill lumber before treatment/implement procedures during treatment/drying processes preventing lumber from warping/developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of exposed treated woodwork.

C. Fire-Retardant Particleboard: made from softwood particles/fire-retardant chemicals mixed at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 25 or less when tested per ASTM E84.
1. Panels ¾" thick and less, comply with ANSI A208.1 for Grade M-2 except for the following minimum properties: rupture modulus, 1600 psi; elasticity modulus, 300,000 psi; internal bond, 80 psi; and screw-holding capacity on face and edge, 250 and 250 lbf, respectively.
2. Panels 13/16" to 1¼" thick, comply with ANSI A208.1 for Grade M-1 except for the following minimum properties: rupture modulus, 1300 psi; elasticity modulus, 250,000 psi; linear expansion, 0.50%; and screw-holding capacity on face and edge, 250 and 175 lbf, respectively.

2.5 ACCESSORIES

A. Wire-Management Grommets: circular, molded-plastic grommets and matching plastic caps with slot for wire passage. Outside diameter: 1¼". Color per manufacturer options.

B. Paper Slots: 12" long by 1¾" deep; molded-plastic, paper-slot liner with ¼" lip. Color per manufacturer options.

2.6 MISCELLANEOUS MATERIALS, adhesive for bonding:

A. Plastic Laminate: as selected by fabricator to comply with requirements.

B. Edges: hot-melt adhesive or adhesive specified above for faces.

2.7 FABRICATION

A. Lightly sand fire-retardant-treated wood to remove raised grain on exposed surfaces before fabrication.

B. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1” over base cabinets. Ease edges to radius indicated for the solid wood (lumber) members: 1/16” unless otherwise indicated.

C. Complete fabrication, including assembly, 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 7 days in advance of date(s) countertop 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 various parts fit as intended, and check measurements of assemblies against field measurements before disassembling for shipment.

D. Shop cut openings to maximum extent possible to receive appliances, plumbing fixtures, electrical work, and similar items. Accurately locate openings, and use templates or roughing-in diagrams to accurately produce sized/shaped openings. Sand edges of cutouts to remove splinters and burrs. Seal cutout edges by saturating with varnish.

PART 3 - EXECUTION

3.1 PREPARATION: before installation, condition countertops to average prevailing humidity conditions in installation areas and examine shop-fabricated work for completion and complete work as required, including removal of packing.

3.2 INSTALLATION

A. Install countertops to comply with same grade as item to be installed.

B. Assemble countertops/complete fabrication at Project site to extent not completed in the shop. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items. Accurately locate openings, and use templates/roughing-in diagrams to produce accurately sized/shaped openings. Sand edges of cutouts to remove splinters and burrs. Seal cutout edges by saturating with varnish.

C. Field Jointing: where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings. Secure field joints in countertops with concealed clamping devices located within 6” of front/back edges and intervals not exceeding 24”. Tighten per manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.

D. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. 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.

F. Countertop Installation: securely anchor by screwing through base cabinet corner blocks or other supports into underside of countertop.

1. Install countertops level and true in line. Use concealed shims as required to maintain not more than a 1/8” in 96” variation from a straight, level plane.
2. Secure backsplashes to tops with concealed metal brackets at 16” on center and to walls with adhesives.
3. Seal joints between countertop and backsplash, if any, and joints where countertop and backsplash abut walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

3.3 ADJUSTING & CLEANING

A. Where possible, repair damaged/defective countertops, to eliminate functional/visual defects. Where not possible to repair, replace countertops. Adjust joinery for uniform appearance.

B. Clean countertops on exposed and semi-exposed surfaces.

C. Protection: provide Kraft paper or other suitable covering over countertop surfaces, taped to underside of countertop at a minimum of 48” on center. Remove protection at Substantial Completion.

END OF SECTION 123623

SECTION 123661.19 - QUARTZ AGGLOMERATE COUNTERTOPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Quartz agglomerate countertops.
2. Quartz agglomerate backsplashes.
3. Quartz agglomerate end splashes.

B. Related Requirements:

1. Section 224100 "Residential Plumbing Fixtures" for sinks and plumbing fittings.

1.3 ACTION SUBMITTALS

A. Product Data: For countertop materials.

B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.

1. Show locations and details of joints.
2. Show direction of directional pattern, if any.

C. Samples for Verification: For the following products:

1. Countertop material, 6 inches (150 mm) square.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For quartz agglomerate 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.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.

B. Installer Qualifications: Fabricator of countertops.

C. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and execution.

1. Build mockup of typical countertop as shown on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

1.8 COORDINATION

A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 QUARTZ AGGLOMERATE COUNTERTOP MATERIALS

A. Quartz Agglomerate: Solid sheets consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with ICPA SS-1, except for composition.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Cambria.
b. DuPont; DuPont de Nemours, Inc.
c. Wilsonart LLC.

2. Colors and Patterns: Match Architect's samples.

B. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.2 COUNTERTOP FABRICATION

A. Fabricate countertops according to quartz agglomerate manufacturer's written instructions and the AWI/AWMAC/WI's "Architectural Woodwork Standards."

1. Grade: Custom.

B. Configuration:

1. Front: 1-1/2-inch (38-mm) laminated bullnose.
2. Backsplash: Straight, slightly eased at corner.
3. End Splash: Matching backsplash.

C. Countertops: 3/4-inch- (19-mm-) thick, quartz agglomerate with front edge built up with same material.

D. Backsplashes: 3/4-inch- (19-mm-) thick, quartz agglomerate.

E. Fabricate tops with shop-applied edges unless otherwise indicated. Comply with quartz agglomerate manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

1. Fabricate with loose backsplashes for field assembly.

F. Joints: Fabricate countertops without joints where possible.

G. Joints: Fabricate countertops in sections for joining in field, only where required due to size and weight.

1. Joint Locations: Not within 18 inches (450 mm) of a sink or cooktop and not where a countertop section less than 36 inches (900 mm) long would result, unless unavoidable.
2. Joint Type: Sealant filled, 1/16 inch (1.5 mm) in width.

H. Cutouts and Holes:

1. Undercounter Plumbing Fixtures: Make cutouts for fixtures 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 (5 mm) 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.
4. Counter-Mounted Cooktops: Prepare countertops in shop for field cutting openings for cooktops. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.

2.3 INSTALLATION MATERIALS

A. Adhesive: Product recommended by quartz agglomerate manufacturer.

B. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to receive quartz agglomerate 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 (3 mm in 2.4 m), 1/4 inch (6 mm) maximum. Do not exceed 1/64-inch (0.4-mm) 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 quartz agglomerate manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with quartz agglomerate 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. 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.

H. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

END OF SECTION 123661.19